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This issue is one of 4 *Bulletins* issued during the year by Consumers' Research which are not confidential. This *Bulletin* may be freely discussed with friends. We hope that you will use the opportunity to show them what CR is doing for consumers. ¶The *General Bulletin* is available not only to individuals, but to libraries, schools, and other groups, at $1 for the subscription year October through June. The next non-confidential issue will be the January 1939, number. ¶Responsibility for all specific statements of fact or opinion at any time made by Consumers' Research lies wholly with the technical director and staff of the organization. ¶Please send notice of any change of address at least two weeks before it is to take effect, accompanying your notice with statement of your previous address. Duplicate copies cannot be sent to replace those undelivered through subscriber's failure to send advance notice, except at the regular price for orders of such material as back issues. N.B.—For a detailed account of CR's early history, policies, and information as to the answering of special inquiries about commodities, subscribers are urged to read the *Introduction to Consumers' Research*, which is sent to anyone without charge.

Symbols used to indicate sources of data and bases of ratings:
A—recommended on basis of quality.
AA—regarded as worthy of highest recommendation.
B—intermediate with respect to quality.
C—not recommended on basis of quality.
cr—information from Consumers' Research's own tests or investigations.
1, 2, 3—relative prices, 1 being low, 3 high.
37, 38—year in which test was made or information obtained by the staff of Consumers' Research.

Off the Editor's Chest

Is the Consumer Movement a Liability or Asset to you? The Consumer Movement *is gaining momentum and power. Although some of its leaders are avowedly hostile to advertising,* the rank and file are concerned only with finding out how to get the most value for their money.

Readers of advertising *are being taught to ask intelligent questions.* The wise advertiser is studying how he can best anticipate *questions which will be asked about his product.*

The manufacturer who lags behind in this respect will lose sales to wide-awake competitors who have geared their advertising to satisfy critical and discriminating buyers.

May we show you our up-to-date exhibit covering the Consumer Movement? It entails no obligation on your part. It will show you examples of advertising campaigns which are taking advantage of the growing public interest in FACTS. It may show you how your product can be made more appealing to consumers. Our representative will be glad to call at your convenience. HAWLEY ADVERTISING COMPANY, INC., 95 Madison Avenue, New York City. [Italics ours—CR.]

The ad-writer who worded this advertisement which appeared recently in *Printers' Ink Monthly*, a magazine of the advertising trade, was not correctly informing his readers if, as might be inferred, his remarks referred to such an organization as Consumers' Research, for as far as concerns that national and pioneer consumer organization, the statement is but a half-truth. Consumers' Research is not avowedly or otherwise hostile to fair, truthful, straightforward advertising; CR is solidly and consistently against false and misleading advertising of all kinds. The writer of the advertisement would do well to review an editorial which appeared in the July 28, 1938 issue of *Printers' Ink*, published by the same corporation as *Printers' Ink Monthly*. This said in part:

> The merchandiser of a worthy product, straightforwardly advertised, has nothing to fear from an educated buyer. On the contrary, he is accorded a measure of protection from less scrupulous rivals. In the long view, the establishment of sound and unprejudiced machinery for consumer education appears as a valuable control upon the marketing process. It simply tends to apply in more rapid and effective form the economic law of the inevitable elimination of the unfit and undeserving seller.

CR's purpose is to educate consumers to become intelligent buyers, to know rather than to guess, in their purchasing; we have been pleased to note of late that CR's influence is being increasingly felt, even in the somewhat unreal and fantastic world of high-power advertising, by the more discerning advertisers, if not their agencies, who are beginning to take the sane and logical view toward consumer education set forth in the quotation just cited. The day of Phineas T. Barnum has passed for most of our literate citizenry, and while there will always be a certain percentage of gullible consumers available for exploitation by propagandists and advertisers, both of government and business, it has in the past ten years become increasingly difficult to deceive by tricky and pseudoscientific advertising and publicity some millions, at least, of the American population.

R. J.

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OWNING vs. RENTING AN AUTOMOBILE

THE National Bureau of Standards has recently made available a five-page mimeographed pamphlet entitled "Automobile Costs," in which the costs of owning and operating a car are divided into (1) "Fixed Expenses," which cover depreciation, insurance, license fees, taxes, interest, and housing, and (2) "Running Expenses," which include gasoline and oil, greasing, washing, minor repairs, parking charges, etc. The figures are more or less estimated, but they are probably fair approximations to average costs for automobiles in the low-price groups. They are based on a period of one year with 10,000 miles of travel.

Fixed Expenses

Depreciation	$200 per annum	
Insurance	50 per annum	
License fees, taxes, etc.	20 per annum	
Interest	10 per annum	
Housing	100 per annum	
Total fixed expenses		$380

Running Expenses

10,000 miles at $.02		200
Total cost per year		$580
Total cost per month		48
Total cost per mile		5.80c

As to the cost to the consumer of renting instead of owning an automobile, the answer is supplied in an article in *Baldwin's Business Brevities*, a house magazine issued by Baldwin Paper Co., 233-245 Spring St., N.Y.C. We quote:[1]

MORE EXPENSIVE THAN YOU THINK

RECENTLY, on account of hard times, I thought I would face the facts about the cost of owning and operating an automobile. So I asked a company that leases cars to quote a price on an $883 Chevrolet and a $1342 Buick.

They said they would lease a new Chevrolet, on a yearly basis, for $12.55 a week plus 3c a mile. That would make the yearly cost $952.60 for a mileage of 10,000.

For the Buick they wanted $15.70 a week plus .045 a mile, making the yearly charge $1266.40 for 10,000 miles. On this basis, it costs approximately $300 more a year to drive a Buick.

Friends to whom I have quoted these figures find them startling and consider them too high, but the company claims they are reasonable. They include every item of expense: interest on investment, depreciation, license plates, all kinds of insurance including damage to the car itself, maintenance and repairs, washing, painting, oil, gas and lubrication, tires, battery, antifreeze, etc.

The company says that any owner of an automobile who keeps his car in first-class condition pays out an equal sum.

Frequently, I glance at the household budget column in the daily newspapers in which Puzzled Wife wants suggestions for the apportionment of her husband's salary of $200 a month. The editor of a column stated that $30 a month had to be set aside for the operation of an automobile, so I asked her to tell me the basis of her calculation.

She explained that her figure was the barest minimum that could be justified by any statistics to which she had access. She used $30, she explained, "because the average citizen is more interested in justifying his spending than in finding out the actual cost."

She continued: "After reading thousands of letters from people who are in financial difficulty, it is my honest opinion that the automobile is sinking a whole social class into a poverty from which they, and possibly their children, can never recover."

We confess that it was a jolt to us to be quoted a price of $952.60 for a year's use of a Chevrolet. We can see how a man who drove a car seven or eight years and did his own repairing and washing and went without insurance could cut the cost considerably, but we think that $30 a month is much too low for a thousand miles a month of driving any car. Three cents a mile accounts only for oil, gasoline, and maintenance.

* * *

Using the National Bureau of Standards' figures as a basis for comparison with the rental figures given in the article, "More Expensive Than You Think," it would appear that it costs $372.60 more per year to rent a *Chevrolet* than it costs to own and operate a *Chevrolet* under the same conditions. The rental figures are claimed to include every item of expense but it is doubtful if it could be meant to include housing (garage rent). If it is a fact as estimated that the rental charges do not include the item of housing, the cost of renting, reported in the trade journal article quoted, runs to $472.60 more than the cost of owning a light car like the *Chevrolet*, as reckoned by the Bureau of Standards. It would seem that the conclusion might be fairly drawn that the rental companies overestimate the amount that will be expended by consumers in operating their own cars.

Subscribers interested in obtaining the circular on "Automobile Costs" may do so by requesting *Letter Circular LC-520* from the National Bureau of Standards, Washington, D.C.

[1]Reprinted by special permission from *Baldwin's Business Brevities.*

Toothbrushes

At the risk of being charged with slight immodesty in beginning an article with a tribute to the value of CR's service, we hope readers will find it pardonable in this instance because an exceptional illustration is presented of the real and practical character of the savings which can be made by following CR's advice, even in the purchase of everyday articles in common use. We quote: "This has been my first year with CR and I am more than pleased with the service that you have rendered for such small compensation. My wife and myself save enough in a year, on tooth brushes alone, to pay for the subscription. It would be impossible to estimate the total saving or even the benefits brought to us in the form of better goods. I am an airplane mechanic by trade but even so, more than one point made in your discussions has been applicable to my work."

How was this subscriber able to save $3 per year on toothbrushes? It was not necessary to refer to the subscriber for particulars, because data were available by which the possible savings could be figured out for particular cases. Had our correspondent and his wife been in the habit of buying an expensive brush in the *C. Not Recommended* class, a shift to an inexpensive, durable brush would have produced savings of well over the amount which he mentioned. Assuming purchase of a highly advertised brush in the *C. Not Recommended* class at 50 cents, good for the equivalent of one month's use before bristle failure, the cost per year for two persons would equal $12. Change to a 10-cent *A. Recommended* brush, which experience shows will be good for about two months' or more satisfactory use, the total cost per year would be but $1.20, representing a saving of close to $11, or $5.40 per person.

* * *

Did you buy one of *Dr. West's* toothbrushes in the "New Professional Shape" with waterproofed bristles this summer and thus help Weco Products Co. clean out their old stock? If you did, was it a 35-cent brush which you bought in a paper carton, or the 50-cent brush in the grand glass tube which has been such a big seller? A trade paper reports (and this is borne out by statements of a druggist friend) that Weco Products Co. expects in October to bring out a new Dr. West's brush made of synthetic bristle filaments, recently developed by E. I. du Pont de Nemours & Co., instead of animal bristles now used. The great problem of clearing out the stock of old brushes so that they will not interfere with the sales of the new article when its advertising campaign is sprung on the public, has been substantially solved by packing regular Dr. West's brushes in cellophane-wrapped cartons and selling them at 35 cents right beside the *same* Dr. West's toothbrushes packed in their beautiful glass tubes at 45 to 50 cents. If you did buy a Dr. West's this summer, CR hopes you saved 15 cents by buying the 35-cent one, as the two brushes were identical. However, if you insisted on paying 50 cents for the brush also sold at 35 cents, you were not alone, for lots of people did likewise, to the greater profits of Weco Products Co. Perhaps you didn't buy Dr. West's, but when you found your "old brush was cheating," decided to "brush clean both sides" with *Tek*. Or again it may have been "the famous tuft" of *Pro-phy-lac-tic* which lured you, or a "scientifically designed—carefully manufactured" *Fuller*. [The words in quotation marks are in each case from advertising material or brush cartons.] It would not be surprising if you have bought a brush of one of these makes recently, for according to *Business Week*, July 8, 1938, reporting on a survey of sales by brands in 53,124 homes, *Dr. West's* toothbrushes were selling far ahead of all others with 31.1 percent of sales, *Pro-phy-lac-tic's* came second with 12 percent, and *Fuller* and *Tek* ran neck and neck for third place. Yet only the *Fuller*, of these four well-known brands, can be recommended on the basis of CR's tests—which tells, as well as one could in a small space, how little one can depend on popular support of widely advertised products as an indication of their actual quality and value at the price charged.

Primitive man needed no toothbrush. He ate few starchy foods and almost no sweet foods, entirely lacked candy, white bread, cornstarch pudding, and French pastry, while much of what he ate was so coarse or tough as to require thorough mastication, thus furnishing stimulation for the gums while it was being chewed. Where primitive races still exist, as, for instance, the Maori in New Zealand, the Eskimos in the Far North, and the natives in parts of Australia, their teeth are practically free from decay—perfect, judged by the white man's standard—even into old age. It is a fact of great interest to those concerned with the progressive decadence of man's chewing equipment, that in every case where these primitive races have come into contact with civilization and begun to consume white man's food, from white flour to canned peaches, tooth decay has set in rapidly and conspicuously.

To quote from an English *Leaflet for the Use of Parents* cited in Dr. J. Sim Wallace's excellent book, *The Physiology of Oral Hygiene and Recent Research:* "Decay of teeth is caused by the fermentation of food that sticks on or between the teeth after meals. Acid is formed from the food, and this acid eats holes into the teeth. It is only the 'starchy' and 'sugary' foods... that form acid in the mouth.... Correct feeding and chewing are the best means of preventing decay of the teeth, though the intelligent use of the tooth brush will be found helpful."

Research is coming to point very definitely to the fact that no amount of vitamin C consumed in orange and tomato juice, etc., can prevent tooth decay; neither can an ingeniously advertised dentifrice (particularly if it happens to contain sugar

or starch!). So far as concerns fruit juices, it is now an established fact that tooth decay can be markedly increased by overuse of oranges, lemons, grapefruit, and other acid fruits. When these fruits appear in the diet in excess, the acids which they contain act directly upon the tooth enamel, and dentists who have done notable work in the field report that in some cases considerable breakdown of tooth structure and development of cavities have occurred.

Perhaps everyone living on a "civilized" diet must expect a considerable amount of trouble with teeth. Nevertheless, damage to the teeth through diet can be held to a minimum by eliminating all excessive use of starchy and sugary foods (including, for example, canned fruits, soda fountain delicacies, and the like), and acid fruits and fruit juices. Granting that for economic reasons and because of custom considerable quantities of carbohydrate foods will be consumed by Americans, it will be worth while to clean the teeth and teeth crevices regularly and carefully with a good toothbrush to remove particles of carbohydrate and other foods that would otherwise ferment, producing lactic acid and, in time, causing harm to the tooth enamel.

Dentists have not to date set any standard for toothbrushes through the American Dental Association, but it is coming to be the belief of leaders of the dental profession that the best type of brush is one of extremely simple design (see illustration). There is little the toothbrush manufacturer can do to modify or improve this design except for purposes of providing the advertising copywriter with something to talk about and something to wax pseudoscientific about in large and expensive words in the pages of popular magazines.

An authority on toothbrushes describes the ideal brush as follows: The head should be about 1 to 1¼ inches long and about 5/16 of an inch wide; there may be either two or three rows of bristles in tufts about 3/32 of an inch apart in the rows in order that the bristles may easily clean the spaces between the teeth; unbleached, fairly stiff Siberian or North China boar bristles are the best. In a two-row brush the space between rows should be about ⅛ inch and in a three-row brush, about 1/16 inch; tufts of bristles should be compact, tightly packed, and be trimmed to a rough cone shape; tufts should be of a uniform height slightly less than ½ inch; no tufts should stand up above the others as they do in the *Pro-phy-lac-tic*, *Dux*, and other similar brushes.

Apparently this growing body of opinion as to what is the correct shape of a toothbrush has made itself felt even in the circles of national advertising and merchandising, for *Dr. West's* emphasizes the "New Professional Shape," and the Pro-phy-lac-tic Brush Co. sells two *Masso* brushes which do not carry "the famous tuft." One of these is a two-row brush at 35 cents and the other is a three-row brush at 25 cents. CR found both to be good brushes. The fact that the Pro-phy-lac-tic Brush Co. continues to feature its freak-shaped tufted brush instead of its brush of scientifically sound design is an example

The preferred type of toothbrush.

of the power of a kind of advertising which is disadvantageous to the consumer.

The following, taken from *Dentifrices and Tooth Brushes*, by Edward M. Andres, published by Phoenix Junior College, Phoenix, Arizona, is important:

WARNING

It is well to bear in mind that proper tooth brushing, with the emphasis on "proper," is helpful in maintaining mouth health. It is not a "cure-all." If done improperly, it may even be harmful.

Harsh dentifrices should never be used.[1]
The use of a dentifrice once a day is sufficient.[2]
Brush the teeth once a day without a dentifrice.
Brushing should never be brisk.[2]
The teeth should always be brushed away from the gums.
If the gums are sore, the brush should not be used without consulting a dentist.[2]

It requires about four to six minutes' continuous effort to clean the teeth well and to stimulate the gums with the brush, but too much time must not be spent on some surfaces that are easy to brush, as the abrasion of these surfaces may result in tooth decay from excessive brushing.[2]

For the benefit of those readers who do not have at hand CR's *Bulletin* of May 1936, the method described there of sterilizing bristle toothbrushes is repeated here. Mix three *Chlorazene* tablets (made by The Abbott Laboratories, N. Chicago) in two ounces of water in a wide-mouthed bottle. After using, wash the toothbrush with running water and place it in the chloramine solution for about ten minutes. Then hang it up to dry. Better sanitation will be possible if two brushes are used, one at night and the other in the morning.

Toothbrushes should not be washed in hot water, for hot water hastens the softening of the bristles and hence shortens the life of the brush.

The methods used in the test of toothbrushes just completed by CR were very similar to those noted

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[1] Many of the widely sold and advertised dentifrices *are* harsh, for the strongly abrasive dentifrice tends to give the consumer the feeling of "getting somewhere" with his toothbrush. He is getting somewhere, but decidedly not to the ultimate advantage of his teeth.—Consumers' Research.

[2] These are important points. Few realize that overuse or improper use of the toothbrush may be considerably worse than not using one. Much damage can be and is continually done that results in expensive trips to the dentist's office, by overenthusiastic and unthinking use of the toothbrush, tooth powders and pastes.—Consumers' Research.

in CR *Bulletin*, May 1936, and the description of the test will accordingly not be repeated here. Brushes which were rated *C* because of a shape considered unsatisfactory or unsuitable were not tested for loss of bristles and ability to stand up under long-continued brushing.

Ratings are based on correctness of shape and size, ability to retain bristles, and freedom from "bushing" or spreading of the bristles; all are cr 38.

A. Recommended

Takamine Scientific (Sold by Whelan Drug Stores, Inc.) 5 for 49c. The word "Japan" is inconspicuously placed on the edge of the bristle head, where the mark tends to become obliterated after repeated wettings (instead of being plainly stamped on the handle). **1**

Masso Dental Type (Pro-phy-lac-tic Brush Co., Florence, Mass.) 25c. **2**

Fuller Correct Shape (The Fuller Brush Co., Hartford, Conn.) 35c. **3**

Masso 2-Row (Pro-phy-lac-tic Brush Co.) **3**

B. Intermediate

Approved, Cat. No. 8—5004 (Distrib. Sears, Roebuck & Co.) 29c plus postage. May be judged by some as slightly too wide. **2**

Cal-So-Dent (Calsodent Co., Inc., 215 Fourth Ave., N.Y.C.) 50c. **3**

"DD" Double Duty (Rubberset Co., Newark, N.J.) 50c. May be judged by some as slightly too wide. **3**

Pycopé (Pycopé, Inc., Joplin, Mo.) 47c. **3**

C. Not Recommended

Dux (Sold by F. W. Woolworth Co.) 10c. Tufted. **1**

Montgomery Ward Dental Style, Cat. No. 53—3940. 19c plus postage. **1**

Takamine Certified 229 (Sold by Whelan Drug Stores, Inc.) 2 for 29c. Had painted handle, undesirable. ("Japan" marked same way as on *Takamine Scientific*.) **1**

Tefra Lifetime, Refillable. 25c; refills, 15c. **2**

Contra-Angle Unbleached, Extra Hard (Harry J. Bosworth Co., Chicago) 50c. **3**

Contra-Angle Bleached, Medium. 50c. **3**

Dr. West's New Professional Shape, Water-Proofed. In tube, 50c; in box, 35c. **3**

Pro-phy-lac-tic. 50c; present sale price, three for $1. Tufted. **3**

Tek. 50c; present sale price, two for 51c. **3**

SPECIAL NEW ADVISORY SERVICE AVAILABLE

HERETOFORE CR has had no facilities or advisers who would be in a position to serve by correspondence, subscribers needing help on miscellaneous personal problems having a business or financial angle. We are happy now to be in a position to announce the availability of a consultant on what, for want of a better name, we may call "general affairs." This consultant is a retired business and professional man of wide experience, who has had occasion in the course of his professional career to face and solve many diverse problems. The knowledge which he has thus acquired (and he is in a position still to enlarge it through his connections and contacts), he is desirous of putting to use for the benefit of others. (It should be noted, however, that he does not propose to answer questions relating to the investment of money.) CR knows the gentleman personally, can vouch for his disinterestedness and unselfish motivation, and can speak in the highest terms of his integrity.

Those wishing to seek his advice should include with their communication the sum of $1; no further fee will be required. This charge is set, not in any attempt to make the service pay for itself, but only because it is thought that the service fee may help to limit the number of inquiries to such number as can be practicably handled and to such persons as seriously wish help to the extent of being willing to present their problem clearly and carefully in writing. If the consultant is unable to answer a question, the money will be refunded. Some perplexing questions may by their very nature be unsuitable for him to handle—questions, for instance, for which a lawyer should be retained, or which are so involved as to call for long study and perhaps one or more personal consultations. Sometimes the volunteer adviser instead of telling the inquirer definitely what to do, may tell him what direction his study and thinking on the problem should take or whom else he should consult or what factors should be specially weighed in reaching a decision.

Subscribers—or others, since it is not Mr. Weiss' intention to limit his offer to CR subscribers—wishing to avail themselves of this consultant's services, should address him direct: Mr. William S. Weiss, 161 W. 86 St., N.Y.C. If convenient to do so, the inquirer may send an extra carbon copy of the letter of inquiry to Consumers' Research for its information and file. It may be added that of course matters of a private and confidential nature will be handled quite impersonally and in a strictly confidential fashion.

Household Glues, Cements, and Liquid Solders

In nearly every household, repairs calling for the use of some type of adhesive are frequently necessary. Unless the handyman of the house happens to be a "home-craftsman" with a well-equipped workshop, the usual procedure is to go to the nearest five-and-ten-cent or hardware store and buy a convenient tube of whatever type or brand of glue or cement is available. While with luck one may sometimes make a workable or temporary repair by this method, failure as often as not attends the consumer's efforts, for it makes a great deal of difference what type of glue or cement is used, and, besides, the technique employed in making the joint is often vitally important. Glued joints give a great deal of trouble with unexpected or unaccountable failures.

In the opinion of many authorities, the principal causes for failures of glued joints are insufficient drying, discontinuous films, films of varying thickness, and bubbles. All these factors, except that of drying, can be controlled by careful application of the glue. The surfaces to be joined should be scrupulously clean and dry. On porous materials it is advisable to apply a preliminary coat. This first coat may, if necessary, be thinned to assist penetration. After the first coat, if one has been used, is dry, a second thin coat is applied and the parts to be secured are brought into proper contact after taking care to even out the film and remove any bubbles. When hot glue is used, the joints will be stronger if the pieces to be joined are themselves heated somewhat to prevent chilling of the glue on contact. Roughening with sandpaper does not improve glued joints, and scraping the contact surfaces makes for weaker joints. Too much glue will keep the surfaces apart instead of joining them together, and long experience has shown that the thinnest film of glue possible usually produces the best results.

The most common adhesives for household use, (excluding pastes, mucilage, sodium silicate mucilages sometimes sold as cements, and rubber cement, because of their limited or specialized application) can be divided into five groups, as follows:

1. *Cellulose-Base and Resinous Cements.* The resinous types are likely to be brownish in tint, and on this account their field of use is more limited than the cellulose-base types, which are clear cements. Both these types are by and large water-resistive and flexible (can bend without cracking). Their makers recommend them for all sorts of common repairs, including fabrics, leather, wood, paper, metal, glass, china, marble, etc. They cannot, however, be used on rubber and actually are not economical or desirable for use on wood and many other organic materials.

2. *Liquid Glues and Animal Glues.* Liquid glues are commonly made from the heads, skins, bones, and swimming bladders of fish. They are not usually as satisfactory as good animal glues (which may also be prepared in liquid form). Liquid glues are convenient in that they are adapted to being produced in ready-prepared form suitable for use by the inexperienced or unskilled consumer. So-called animal glues, not made from fish, which come in dry form (slab, flaked, or ground), are made chiefly from animal hides or bones, those made from hides being superior in adhesive qualities. Animal glue is made ready for use by soaking overnight in sufficient water to more than cover it. The excess of water is then poured off and the glue melted in a gluepot which is in the form of a "double boiler." A suitable boiler can readily be improvised by using two tin cans of different diameters; the inner can must be separated from the outer, particularly on the bottom, to avoid scorching the glue. This type of glue must be applied hot. Care should be taken that the glue has not been too often heated, for too frequent heating results in loss of strength. Both the animal glue and the ready-prepared liquid glue have the disadvantages of being neither water-resistive nor colorless. While they are most commonly used for patching and small gluing jobs on wood, they can sometimes be used to repair the materials named under cellulose-base adhesives. Animal glue can be made water-resistive by adding potassium bichromate in the proportion of 2 percent of the weight of the dry glue.

There are many tests for quality of animal glue but all are laboratory procedures beyond the scope of the small-lot purchaser. The grading systems in use by the glue manufacturers are of little value to consumers as they are not standardized. For the benefit of those who purchase animal glues, the following hints will tend to ensure the purchase of a good quality glue. Color cannot be trusted as an index of quality, for glues can be chemically clarified at the expense of the adhesive properties. If glues absorb moisture and become gummy on standing in the air, it may indicate addition of substances like sugar, molasses, etc. Ground glue, which is easier to adulterate than the flake or slab variety, should not become lumpy in warm, humid weather. Glues with a sour or decomposed odor, and those which foam when being prepared for use, should be avoided. In purchasing slab glue, break a sample with the fingers. A glossy fracture indicates a bone glue; hide glue, which is superior, does not show gloss. When a thin sheet bends well and has a splintery fracture when broken the glue is judged to be of good quality.

Many householders having use for cellulose-base adhesives, resinous cements, or "liquid solders" in considerable quantities will wish to compound their own, but due to the hazard of poisoning from the volatile organic solvents (particularly serious with some of the solvents commonly used and useful in such cements), their manufacture at home cannot be recommended. Moreover, there is a serious fire hazard in any home manufacture of cellulose-type (celluloid) cements. Even the purchased cements of these types should be used with caution, both because of their extreme inflammability during use and after the joint is finished, and because of serious

hazard of poisoning in any case where the vapor is likely to be breathed for any considerable time, or in a poorly ventilated space. The reader should not assume that this hazard is exaggerated by CR, for some of the most dangerous of modern industrial solvents are of the very type likely to be used in household cements which have the characteristic banana oil (amyl acetate) type of odor.

3. *Casein Glues.* These are made from sour skim milk (dried, ground, and blended) and are available as a dry powder requiring only the addition of cold water to form a satisfactory liquid glue. (Following the mixing, one must wait about fifteen minutes before using the glue.) While some casein glues are water-resistive, this is not true of all brands (see listings). Copper salts added to casein glues improve their resistance to moisture. Two to three parts by weight of copper chloride or copper sulphate should be dissolved in 30 parts of water and added to 500 parts of the ordinary casein glue after the glue has been mixed for use. The chief use of casein glues is on wood, leather, fiber, linoleum, etc. There have been unexpected difficulties of several kinds in the use of casein glues on wood, and consumers have been led to expect far too much from them in the way of waterproofness and other elements of performance. One important disadvantage of casein glue is its tendency to stain thin wood or veneer. While glue manufacturers may claim that this difficulty has been corrected to some extent in some makes of glue, subscribers would be well advised to make certain that the casein glue they use is free from this defect before attempting to use it on valuable work. Even if tests were made, there would be no certainty that a product of the same brand would be free from the difficulty at some later time. Therefore on any important gluing problem, where valuable woods are involved, the consumer would do well to put the problem squarely up to the manufacturer of the glue proposed to be used, and get his assurance of safety in this regard, *in writing*, with the understanding that if staining occurs, the glue manufacturer will accept responsibility for full restitution by replacement of the article or of the stained surfaces. In a case recently brought to CR's attention, casein glue caused such disfiguring stains on the interior $\frac{3}{8}$ inch mahogany panels of a yacht that the builder agreed to renew all the panels at his own expense. The difficulties are the more serious because (as in the case cited) the stains *may* not appear for a year or more after the work is completed.

4. *"Liquid Solders."* The so-called liquid solders are practically identical with the cellulose and resinous cements, except for their aluminum-like color; they are not dissimilar to a very thick aluminum lacquer. The addition of the metallic powder has no known purpose beyond that of making the finished product bear a resemblance, in the eyes of the unschooled user, to solder. In some cases, this resemblance has been misleading in the highest degree, for consumers have supposed that the term "liquid solder" was to be taken literally, and that a joint equivalent in electrical conductivity or otherwise to a metallically soldered joint would be produced by their use. Needless to say the pseudo-liquid-solders produce a non-conducting and inflammable joint, rather than an electrically conducting, non-inflammable one.

Although the average homeowner may have only occasional need for glues, cements, etc., there is a definite demand for reliable information on those which are particularly suitable for use in the household, and about the householder's private shop. CR has, accordingly, completed tests of 17 different adhesives of the type commonly available in hardware and variety stores and sold for household use in small tubes, tins, or bottles. Tests were based chiefly on the strength of joints obtained by cementing wood pieces together under standard conditions to form a standard test specimen. Whenever the manufacturer's directions were specific and applicable, they were followed exactly in each case. The strength tests were carried on after six to eight weeks' aging of the joint. To eliminate as far as possible any possibility of faults in the application of the glue, several test pieces were made of each brand of glue tested; each fractured surface was also examined to determine if any air bubbles or incomplete contact had existed. Any sample in which such defect was found was left out of consideration in the findings. During the time which elapsed between the purchase of the cements and the end of the test, some samples were found to have hardened in their containers so that they were no longer usable. For this reason, a solder packaged in such a manner that it was permitted to dry up in its container has been noted in the listings; it is important that the packaging of the cement for the consumer who has only occasional use for the material should be of such nature that when he is ready to apply the product it will be in good and usable condition.

Waterproof qualities of the glues were judged by a set of samples of wood secured with the several adhesives and allowed to set for the length of time recommended by the manufacturer. When specific instructions were not shown on containers, samples were allowed to set for twelve hours before testing; these samples were then submerged in water for twenty-four hours to determine their ability to withstand moisture or wetting.

Price ratings are on a basis of weight of the adhesive per unit of price. It did not appear practicable as a technical matter to determine the price ratings upon the more rational basis of the amount of adhesive power furnished per unit of the price asked for each adhesive. However, in the case of the casein glues purchased in dry form, price ratings are based on the quantity of glue which could be made from the contents of the package according to the manufacturer's instructions. The adhesives were water-resistive unless otherwise noted. All ratings are cr 38.

A. Recommended

The following adhesives were all of high strength and gave uniform results.

Casco Grade A Casein Glue (Casein Co. of America, Inc., N.Y.C., subsidiary of The Borden Co., N.Y.C.) "Grade A" is the type widely sold in hardware and general

A. Recommended (contd.)

merchandise stores. It is a powdered glue which required mixing with cold water. CR's tests showed *Casco* not to be waterproof as claimed. ¶The F.T.C. has held that a product may not be described as waterproof when in fact the product is not impervious to water. The firm has agreed to cease labeling and advertising its product as "waterproof." **1**

Le Page's Liquid Glue (Russia Cement Co., Gloucester, Mass.) A fish glue. Like other fish and animal glues, was not waterproof. **2**

Le Page's Liquid Solder (Russia Cement Co.) **3**

Stafford's Household Cement, Clear (S. S. Stafford, Inc., 603-609 Washington St., N.Y.C.) A cellulose-base type. **3**

Tip-Top Clear Cement (Tip-Top Products Co., Omaha, Nebr.) A cellulose-base type. **3**

B. Intermediate

Ambroid Liquid Cement (Ambroid Co., Brooklyn, N.Y.) A resinous cement, with a brownish tint. Average strength was high, but results showed wide variation of different test samples. **1**

Iron Glue Liquid (McCormick & Co., Baltimore) A fish glue. Average strength was high, but results showed wide variation of different test samples. Was not waterproof. **2**

Duco Household Cement, Clear (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.) A cellulose-base type. **3**

Dutch Brand (Van Cleef Bros., Chicago) A resinous type. Strength of joints showed wide variation. **3**

Grip-Fast Cement (Great Lakes Products Co., Chicago) A liquid solder type. Strength of joints showed wide variation. **3**

Knicks Mend-Rite Clear Cement (Knicks Mend-Rite Corp., Kansas City, Mo.) A cellulose-base type. **3**

Lux-Visel Metallic-X Liquid Solder (Lux-Visel, Inc., Elkhart, Ind.) Strength of joints showed wide variation. Method of sealing tube, with pin, deemed not satisfactory for lasting protection of contents. **3**

Testors Clear Cement (Testors Cement Co., Rockford, Ill.) A cellulose-base type. Although labeled "Guaranteed To Stand Boiling Water," the cement was found in CR's test not to resist 24-hour immersion in cold water, after a 12-hour setting period. **3**

Tip-Top Liquid Solder (Tip-Top Products Co.) Strength of joints showed wide variation. **3**

C. Not Recommended

Le Page's Casein Glue (Russia Cement Co.) A powdered glue which required mixing with cold water. Would have received a *B* rating on basis of strength had it not been for erratic performance. Not waterproof as claimed on label. **1**

Soldax Liquid Solder (The Soldax Co., Hoosick Falls, N.Y.) Would have received a *B* rating on basis of strength had it not been for erratic performance. **3**

John Collins Clear Cement (Standard Laboratories, N.Y.C.) A cellulose-base type. Strength of joints was low. **3**

Editor's Note: CR will be glad to consider manuscripts from persons who have had considerable experience in the use of glues and cements in the neat repair of articles of metal, glass, china, pottery, ivory, marble, alabaster, ebony, and the like, in order that the subject of proper selection and use of glues and cements for household and similar uses may be further developed.

Automobile Storage Batteries

Of all the commodities the consumer finds it necessary to purchase on short notice, the automobile storage battery probably falls more nearly into the class of "surprise package" or "grab-bag" sort of item, than do most electrical appliances purchased by consumers.

Nowadays few literate consumers, perhaps, will consider that automobile storage battery advertising or dealers' representations carry any message of consumer significance about the construction or probable life or performance of storage batteries—whether of well-known brands, or otherwise. The ordinary purchaser of a battery has practically no means at his disposal for making even a good guess at what he is likely to be getting, nor any certain assurance of quality in buying either at a high price or by a well-known brand name. When a storage battery is purchased, it is usually needed quickly, upon the unexpected failure of an old battery—perhaps when one is far from any dealer one knows and has confidence in, and under circumstances which permit no time for comparison of prices or other investigation. Hence, there is special danger of being gypped in buying the first make offered at the desired price level.

To complicate the problem for the consumer, some battery dealers will resort to almost any sort of subterfuge to represent the old battery as worthless in cases when it still has a great deal of useful life left in it, and has merely run down through some abnormal operating condition or some defect or fault of the wiring system of the car, or when the battery is in need of some small and inexpensive repair. A bewildered car owner will often have not the slightest clue to whether he needs to purchase a new battery or can make the old one do for several months or a year longer. In such a situation, there are several precautions which the consumer may take to avoid being misled in respect to the necessity for purchasing a new battery. First, have some means of positively identifying your old battery, by a number or private marking of some sort, so that another and actually worthless battery cannot be substituted for it when the dealer shows you that the battery is worn out, or "will not come up on charge." Next, see for yourself by voltage readings

on a high-rate-discharge tester (preferably the hand type, which cannot be manipulated) if one or more of the cells after being charged falls below 1¾ volts. In a case where the dealer has already replaced the battery in your car with another, or gives some reason for not showing you the old battery, it may be worth your while to have a look at the line of batteries on his charging bench. Your battery may very likely be found among them, being charged up to be sold at second hand.

Dealers generally discourage repairing a defective battery, because they can make more money, with less work, in selling a new battery. Storage batteries are coming to be in the same category as packaged goods in the grocery store. The battery is lifted off the shelf and placed in the car in a few minutes, the cash register rings up a sizable sale at a good profit, and the dealer is spared all the trouble and time of studying the condition of the old battery, and of trying it to see if it will take and hold a charge. This tendency, wherever it occurs in dealing with household and automobile accessories and appliances, should be regarded with suspicion and doubt by the consumer, because nearly always it is designed to increase profits by putting sales on a basis of mere turnover rather than technical and mechanical service to the consumer. If a battery is not near the end of its normal life and if only one cell is defective, as is usually the case, it will often pay to have the cell repaired.

If a battery does not receive abuse through improper service conditions, its life is chiefly determined by the thickness or amount of oxide pasted on the plates. A battery sold under a one-year guaranty usually has less than one-half as much active material affixed to the plates as one sold under a two-year guaranty. The capacity of a battery in ampere-hours discharge rate is controlled by the area of the plates, that is, the area of the active material exposed to the action of the electrolyte. Batteries supplied with a new car usually correspond to those carrying the eighteen-month guaranty. For cars equipped with several gadgets, or a radio, or water heaters with electric fans, etc., the heavy-duty battery is essential, and even that type may be inadequate to the hard service imposed.

The warning, "Keep plenty of distilled water in your battery at all times," is given because, if the wood separators are allowed to dry out, they permanently lose "vitality" and may split, considerably shortening the life of the battery. (For additional information on the care of storage batteries, subscribers to the confidential service may refer to CR *Bulletins*, December 1934 and 1935. The latter includes instructions for determining the proper setting for the charging rate of the automobile generator for cars in which the charging rate is not determined by an automatic regulating unit.)

Low-priced batteries will be very unlikely to give first-rate performance; high-priced ones will not always do so, but the *probability* of good service (and that is the most anyone can guarantee with an automobile storage battery) is much higher than with the cheap battery. One of the most common failures of automobile storage batteries is running down under the hard service of winter starting. As tested for endurance under conditions which duplicated the hard service of winter starting (i.e., as measured by the time in minutes to discharge to a final average terminal voltage of 1 volt per cell under a continuous discharge of 300 amperes in a temperature of 0°F), three 13-plate batteries priced below $5 in CR's previous test of batteries (CR *Bulletin*, December 1935) performed so poorly that none could be recommended. In the present test, the three lowest-priced batteries all fell considerably below the higher-priced batteries (with the exception of the *Willard*, which also showed poor performance) in the length of time they would be able to crank an engine under zero weather conditions, as indicated by the test devised to simulate these conditions. An unusual correlation, in this case, was found between price and quality, for the ability of the batteries (with the one exception noted) to crank an engine under severe weather conditions increased rather rapidly as the retail price of the battery increased. These findings have made it clear that the purchase of the cheapest batteries will be inadvisable for most users to whom ability to start under cold weather conditions of the central and northern states is important. The findings now available have shown so consistently that low-priced batteries are poor in reserve capacity for cold weather starting that it is possible to advise against the purchase of any of the very lowest-priced batteries, for cold climate driving; particularly is avoidance of the cheapest batteries important to anyone where an unlooked-for delay because of battery failure would be costly or cause serious inconvenience. (A battery failure in a part of the country where service stations and garages are a long way apart, can be a serious matter and may easily cost many times the difference between the price of the cheapest and a normally priced battery.)

The unreliability of a trade name as a determinant of quality is illustrated in an interesting way by CR's finding with respect to the *Willard* battery. In CR's previous test, it was noted that a 13-plate *Willard* battery showed the poorest performance in cold weather starting, of the five higher-priced batteries tested, while on the other hand a 15-plate *Willard* was best of the group in this respect. This anomalous performance was again found in a *Willard* battery in the present test, the highest-priced ($19.50 list) battery of the group, which showed poorer cold weather cranking capacity than the Sears' *Cross Country* battery, priced at $5.65 plus freight, or less than one-third as much. Its performance in this respect was only a little more than half as good as that of the best battery, the *Exide*, priced at $13.45. It would be hard to find a more interesting illustration of the fallacy of the expressions commonly heard in merchandising circles that the way to buy good appliances is to pay full prices for them, and that an article is "worth what you pay for it."

The results of the present test are in no way indicative of the length of service to be expected from the batteries. The life of a battery in actual service probably cannot be predicted from laboratory tests with a high degree of accuracy; the factors which operate to cause battery failures are numer-

ous, complex, and highly variable, depending on such circumstances as the average and extreme temperature, the purity of the water used for replenishing the electrolyte, the extent to which the battery is subjected to jars and jolts or to overcharge or undercharge in use, and perhaps a score of other items. Nevertheless, battery tests based on electrical performance are useful and should give a good idea of relative values. In any event, most people will agree with the engineers that it may well be poor economy to purchase batteries which give definitely inferior performance in the performance tests. Complete life tests which can be made on batteries are time-consuming and expensive. In fact, they may take so long, if a high degree of certainty is required, that the battery may be replaced by a "new model" by the time the test is finished.

Besides the test for cold weather cranking capacity, the present test included a determination of the ampere-hour capacity of the batteries at low rates of discharge, which might be termed a lighting ability test, since it gives a measure of the capacity of the battery to maintain the lights of the car for a considerable period. The only battery found to fall below its maker's rating in this respect was the *Willard* (which, as has already been noted, was also deficient in the cranking test). At the conclusion of the tests an *A. Recommended* battery and a *C. Not Recommended* battery were taken apart to determine the effect of the tests on the plates. It is of interest to note that in spite of the wide difference in performance between these two batteries, there was no significant difference in appearance of their plates upon visual inspection at the end of the test.

The tests on which the following ratings are based were made substantially in accordance with the 1938 Standard for Storage Batteries for Motor Vehicles of the Society of Automotive Engineers, which is very similar to *U.S. Federal Specification W-B-131b*. All ratings are cr 38.

A. Recommended

Cross Country Power Flo (Distrib. Sears, Roebuck & Co., Cat. No. 28 FM 76) $5.65 plus freight. 17-plate, 100 ampere-hours. 2-year guaranty. In starting capacity at 0°F, ranked fourth of those tested. Considered a satisfactory buy for use under ordinary conditions, where no specially large margin of reserve capacity for sure starting under winter conditions is necessary. Not listed in 1938 fall and winter catalog but *Gold Medal Powermaster*, at $5.15, freight prepaid (Cat. No. 28 KM 60V), shows essentially the same specifications and claims and appears to be the same battery with a change of brand name. Batteries with the original brand name *Cross Country Power Flo* may remain available at Sears' retail stores, but probably at considerably above the catalog price. **1**

Exide Ilycap (Electric Storage Battery Co., Philadelphia, No. XL191S) $13.45. 19-plate, 115 ampere-hours. 2-year guaranty. In starting capacity at 0°F, best of the seven tested. **2**

Goodrich (B. F. Goodrich Co., Akron, Ohio, No. FT1A57) $14.65. 19-plate, 113 ampere-hours. 2-year guaranty. In starting capacity at 0°F, ranked somewhat lower than *USL*. **2**

A. Recommended (contd.)

USL Super Service (USL Battery Corp., Niagara Falls, N.Y., No. FL-19) $13.50. 19-plate, 110 ampere-hours. 2-year guaranty. In starting capacity at 0°F, ranked second best of the lot tested. **2**

C. Not Recommended

Peerless (Distrib. Sears, Roebuck & Co., Cat. No. 28 FM 23) $4.35 plus freight. 15-plate, 91 ampere-hours. 18-month guaranty. In starting capacity at 0°F, ranked poorest of the seven batteries tested, much below rated capacity; performance in this regard so low that battery is more than ordinarily likely to cause trouble sooner or later from "running down" under winter starting conditions. (Sears' *Cross Country*, already listed, at only a slight increase in price gave nearly twice as much starting capacity.) Not listed in 1938 fall and winter catalog but *Gold Medal Emblem*, at $4.35 freight prepaid (Cat. No. 28 KM 52), shows essentially the same specifications and claims and appears to be the same battery with a change of brand name. **1**

Tornado (Distrib. Montgomery Ward & Co., Cat. No. 261PY210) $4.85 freight prepaid. 95 ampere-hours. 2-year guaranty. In starting capacity at 0°F, stood next to the bottom of the list of seven batteries tested. Was by a considerable margin the lightest in weight of the seven batteries tested, suggestive of skimped construction. The only battery tested priced at less than $5 which did not show, plainly marked on the case, the number of plates and adequate, unambiguous capacity ratings. Not listed in large general catalog but found in special sale catalogs; may be sold in retail stores. **1**

Willard Heavy Duty (Willard Storage Battery Co., Cleveland, No. B-110AH) $19.50. 110 ampere-hours. 2-year guaranty. Starting capacity at zero temperature, less than Sears' *Cross Country* sold at about 1/3 the price, and certainly far below what it should be in a battery at nearly $20. Ampere-hour capacity below maker's rating, and considerably below that of other batteries of comparable capacity. The only battery tested priced above $5 which did not show plainly marked on case, the number of plates and adequate, unambiguous capacity ratings. **3**

CR's Cumulative Index

As this *Bulletin* goes to press, the 1935-38 Cumulative Index is about ready to go to the printer. It is expected to run to about 32 pages. All topics treated in CR's *Bulletins* and *Special Bulletins* issued since the previous Cumulative Index of September 1935 are fully indexed, including the *Annual Cumulative Bulletins* of September 1935, 1936, and 1937. The compiling of this index has been a tedious and time-consuming task. We have no objection to make, however, if it fills a real need and helps subscribers to locate desired information quickly. A number have expressed their wish for such an index; the number of orders which we receive will give an indication as to whether in future we should continue to provide such detailed indexing. It is expected that the Cumulative Index will be ready for mailing the latter part of October. The price will be 10 cents, in coin or stamps. In order that we may accurately determine how many copies to print, please send in your order, with remittance, as soon as possible.

TELEPHONE SETS

THREE low-priced telephone sets suitable for use as toys and for transmitting occasional messages over short distances, as from the house to the garage, were reported on in CR's December 1937 *Bulletin*. While none of the three sets gave good speech transmission, two were found suitable for recommendation as toy telephone outfits. These and three other sets not previously reported on are now rated on their comparative suitability for practical short-distance communication.

It must be remembered that the cheap phones found in the ordinary electrical, gift, or department stores are almost certain to be built according to very low standards indeed, of electrical and acoustic performance. The consumer will not find on the market, at three or four dollars a pair, telephones which are useful for business purposes, where clarity of speech transmission is essential so that names and numbers can be correctly and easily understood, and which will continue to give that quality of performance for years. Some cheap telephones, however, will operate *fairly* satisfactorily over considerable periods of time, and are useful for homeowners who wish a telephone connection to the garage, barn, workshop, or basement, at the lowest possible outlay. The ordinary toy telephone is a stamped metal instrument, haphazardly made, with just enough manufacturing control in testing to make sure that some sound will be transmitted and that users will be able to distinguish words if they pay close attention and the person at the other end of the line speaks clearly and loudly into the phone. But there is a big difference from an engineering standpoint between hearing a sound and distinguishing clearly words and syllables that are easily confused in rapid conversation, or in any exchange of information where facts, dates, names, or initials must be correctly understood a goodly proportion of the time.

When purchasing a phone set, if at all possible, have it set up in operation and try speaking through it to a party not within direct earshot of your voice. Try shaking the transmitter up and down; sudden and large variations of sound caused by such shaking indicate a poor transmitter. Some variation, of course, is not objectionable, but in some telephones speech will be interrupted entirely when the mouthpiece is held in certain positions.

The sets tested by Consumers' Research will operate on from two to four No. 6 dry cells (the large ones commonly used for doorbells; these usually sell at twenty-five to thirty cents each). In this service the cells should ordinarily last for at least six months. If the batteries are to be used on one end of the line only, three wires are required for connection between two telephones; if the arrangement is such that batteries can be placed at both ends of the line, two-conductor wires will suffice.

The phones were tested for battery current consumed when ringing and when used for transmission of speech. They were tested for transmission of sound frequencies varying over the range from 200 to 3000 cycles per second (a range which would be adequate for any ordinary telephonic purposes). They were also given practical use and endurance tests.

Prices are per pair of phones and include in some instances a short length of connecting wire. All ratings are cr 38.

A. Recommended

DeVeau, Cat. No. N—2524—A (Stanley & Patterson, Inc., 150 Varick St., N.Y.C.) $13.70, without conductor wire. Wall type; dull black enamel finish. Easily best of the six phones tested in both loudness and quality of tone. Would serve well as a phone for interoffice use. **3**

B. Intermediate

Marvel (Quam, Nichols Co., Chicago; distrib. Wholesale Radio Service Co., Inc., 100 Sixth Ave., N.Y.C., Cat. No. K14024) $2.65, including 35 ft of two-conductor wire. Desk type; dull-black lacquer finish. Noisy (i.e., not free from "background" or self-produced noise); but transmission was third best of the six phones tested, an important item considering the very low price of this make. **1**

Pairfone (S. H. Couch Co., N. Quincy, Mass.; sold by Sears, Roebuck & Co., Cat. No. 20—5990) $4.98 plus postage, including 40 ft of three-conductor wire. Wall type; black lacquer finish. Performance somewhat erratic; but in respect to speech transmission was placed generally as second best of the six phones tested. **2**

C. Not Recommended

Talk-O-Fone (Carron Mfg. Co., 407 S. Aberdeen St., Chicago) $3.50, including 35 ft of single-conductor wire. Wall type; black crackle finish. Somewhat noisy; speech transmission in general poor. **1**

Montgomery Ward & Co., No. 84—9610, Model No. 44-W (Mfr., Connecticut Tel. & Elect. Corp., Meriden, Conn.) $4.69 plus postage, without conductor wire. Wall type; gray lacquer finish. Somewhat noisy and developed worse background noise with use. Speech transmission erratic, as constructional details were such that it was sometimes good and sometimes poor. **2**

Real Phones (American Automatic Electrical Sales Co., Chicago; sold by Wholesale Radio Service Co., Inc., Cat. No. K17373—and by others) $4.12 plus postage, including 35 ft of three-conductor wire. Desk type; dull-black lacquer finish. In most of the tests, its operation was very poor. Somewhat noisy and developed worse background noise with use. It was necessary to speak loudly and directly into the transmitter to be heard satisfactorily. Construction was such that the phones could not be taken apart for repair or adjustment. **2**

SHOE LACES

"JUST give me two minutes to change to my walking shoes and I'll be ready," and away she went to replace her foolish high-heeled pumps with walking oxfords while the others urged speed and sat down to pass the two minutes. The time was nearly up when there came a wail from upstairs: "Mother, where are the new shoe laces?" Of course there weren't any—for few are far-seeing enough to have shoe laces of the right lengths and colors "in stock." So the two minutes lengthened into nearly ten before the old lace was given a satisfactory temporary repair and replaced in the shoe.

CR wonders why the shoe lace industry has never compiled statistics showing the number of trains, buses, etc., missed and breakfasts skipped because of broken shoe laces. Surely a "Keep-Extra-Shoe-Laces-On-Hand" campaign would be at least as logical as most of the high-pressure sales drives to which we have all become accustomed. Perhaps the industry realizes that the real reason that shoe laces break at crucial moments is because of the very human habit of never changing a shoe lace today which can possibly be expected to last until tomorrow.

One thing which the industry could do, however, to make people feel more kindly toward their products, would be to have all its producers accept the Simplified Practice Recommendation for Braided Shoe Laces, promulgated in June 1937 by the National Bureau of Standards. This lists the stock lengths of shoe laces as 18, 21, 24, 27, 30, 33, 36, 40, 45, 54, 63, and 72 inches (above 72 inches, increases in length are by 9-inch increments). A tolerance of plus or minus 2 percent under a 3-ounce tension is allowed. Seven of the 18 brands of shoe laces tested failed to meet the provisions of the Simplified Practice Recommendations. In the following listings, those which met the provisions are marked with an asterisk (*).

There are two general types of braided shoe laces: standard, used for dress and street shoes; work-shoe laces, used for work-shoes, high-cut shoes and boots. The standard laces are usually made of mercerized cotton or rayon (rayon laces being suitable for dress shoes only, because of their low tensile strength). Work-shoe laces are made of wiry cotton threads and are of definitely inferior appearance to the standard type laces. Klondike laces are similar in appearance to the regular work-shoe laces but are much heavier and have about twice the tensile strength of good standard laces. These are sold for high-cut shoes and boots, in lengths starting at 36 inches, and should make excellent work-shoe laces.

Tests of tensile strength, recently made by CR on a number of brands, showed decided differences between laces in the same price groups, and we can safely say that those in the recommended class should give appreciably longer service before breaking than the others. Tips were found to be securely attached and should in general give little or no trouble through coming off.

To facilitate price comparisons, prices per single lace are given in parentheses following the price per laces in pair or other lots as sold. Both black and brown shoe laces of each brand were tested, except as noted. All ratings are cr 38.

Standard Shoe Laces

A. Recommended

**Monogram*, Mercerized (Sold by G. C. Murphy Co.) 5c per pair (2.5c). Had highest tensile strength of the standard type laces tested and were, indeed, practically as strong as the *Sterling* work-shoe laces.

**Reylon* (Sold by J. G. McCrory Co.) 5c per pair (2.5c). Tensile strength, satisfactory; the brown laces were not so strong as the black.

**Victory*, Check Mark Tip (Sold by F. W. Woolworth Co.) 5c per pair (2.5c). Not quite so high in tensile strength as *Monogram*.

B. Intermediate

**Arrow*, Mercerized (Sold by J. G. McCrory Co.) 2 pairs for 5c (1.25c).

Golden Rule, Mercerized (Sold by G. C. Murphy Co.) 3 pairs for 10c (1.7c).

**Green Oak*, Fibre Tipped. Mercerized (Sold by S. S. Kresge Co.) 5c per pair (2.5c).

**Nebco*, Mercerized (Sold by F. & W. Grand-Silver Stores, Inc.) 2 pairs for 5c (1.25c).

**Nebco*, Tips Guaranteed (Sold by F. & W. Grand-Silver Stores, Inc.) 2 pairs for 5c (1.25c).

**Qualitex*, Mercerized (Sold by F. & W. Grand-Silver Stores, Inc.) 5c per pair (2.5c).

Sterling, Cat. No. 25—9732 (Distrib. Sears, Roebuck & Co.) 6 pairs for 10c plus postage (0.8c). Mercerized. Black only.

Wards, Tasseled Tipped. Rayon, Cat. No. 24—5626 (Distrib. Montgomery Ward & Co.) 3 pairs for 7c plus postage (1.1c). Black only.

Wards, Fibre Tipped, Mercerized, Cat. No. 24—5606 (Distrib. Montgomery Ward & Co.) 6 pairs for 9c plus postage (0.75c). Black only.

C. Not Recommended

Empri, Rayon (Sold by F. W. Woolworth Co.) 5c per pair (2.5c).

**Sterling*, Cat. No. 25—9743 (Distrib. Sears, Roebuck & Co.) 4 pairs for 9c plus postage (1.1c). Rayon, tasseled. Black only.

Woodlawn Mills, Rayon (Sold by G. C. Murphy Co.) 5c per pair (2.5c). These had the lowest tensile strength of the shoe laces tested.

Work-Shoe Laces

A. Recommended

Sterling, Klondike, Cat. No. 25—9783 (Distrib. Sears. Roebuck & Co.) 3 pairs for 9c plus postage (1.5c), Black only. For high-cut shoes and boots.

**Wards*, Klondike, Cat. No. 24—566D (Distrib. Montgomery Ward & Co.) 3 pairs for 9c plus postage (1.5c). Black only. For high-cut shoes and boots.

B. Intermediate

**Sterling*, Cat. No. 25—9794 (Distrib. Sears, Roebuck & Co.) 12 pairs for 17c plus postage (0.2c). For work-shoes. Black only. Looks much like the *Klondike* type of lace but was lighter in weight and not much stronger than *Monogram* laces of the standard type.

Exterior Paints

Paste and Semi-Prepared (Semipaste)

BECAUSE of lack of space in the *Annual Cumulative Bulletin*, white lead paste paints and mixed-pigment paints in paste or semipaste (so called) form were omitted from the paint section. As there is considerable demand for information on these types of paints, a brief discussion is given herewith in order that the paint consumer may not be misled to his disadvantage, in purchasing them, for example, on recommendation of a paint dealer or painter. (For latest information on other important types of exterior paints, see CR's 1938 *Annual Cumulative Bulletin*, columns 237 to 239.)

Mixed-Pigment Paints in Paste and Semipaste Form

The group of paint types comprising mixed-pigment paints in the paste and semipaste (semi-prepared) forms is in general inferior in quality to the prepared (ready-to-use except for stirring) mixed-pigment paints, and to white lead paste paints. Although there are a number of important practical advantages in buying paint for certain uses, such as painting the outside of a house, in the paste or semi-paste form rather than in a form which is ready prepared (except for stirring), there are very few commercially available paste paints (with the exception of pure white lead paste) that are of satisfactory quality. The trade practice has been to offer mixed-pigment paints in paste form chiefly for sale to the cheaper class of painters on a price basis rather than a quality basis. Indeed, it has been the case that manufacturers selling a prepared paint of excellent quality have often made in their paste-type paints only an inferior product.

The paste paints of the mixed-pigment types are very often heavily overloaded with cheap transparent pigments. Others are made with good combinations of pigments, but with such small proportions of total pigment that they make inferior paints when mixed as directed on the labels or as painters commonly expect to mix a paste paint. This of course is done in order to give the paint the appearance of having greater covering power, because of competition amongst manufacturers in their claims for the number of square feet of surface which can be covered with a gallon of their brand. For these reasons, it will be wise for those who would be inclined to use a semipaste (semi-prepared) mixed-pigment paint, to purchase a ready-to-use paint instead.

White Lead Paste Paint for Exterior Use

White lead paint remains one of the most widely used kinds of white paint for exterior use. Practically speaking it is sold only in the form of soft paste paint, although the National Lead Company has sold it in the form of prepared (ready-to-use) paint, under the name of "liquid lead," in a limited territory and a few small paint manufacturers sell it in this form. White lead paint means paint in which white lead is the *only white pigment*, though when a colored lead paint is required, small amounts of colored pigments must of course be added. Because white lead pigment has relatively low oil absorption, white lead paint, when correctly mixed by the painter, contains a high content of pigment, which is very desirable, and in spite of this the paint has excellent working qualities. At the same time it is cheaper in net cost to the painter than any other white paint of equal quality. The low cost is due to the fact that it is the only white paint sold directly to the paint trade by the *pigment* manufacturer. To the *paint* manufacturer, who buys white lead and other ingredients and sells mixed-pigment paint to the paint trade, white lead is one of the most expensive ways of putting whiteness into paint.

White lead paint is particularly to be recommended for consumers who repaint at long intervals, say every six to ten years. Strange as it may seem, this recommendation is made because white lead paint is *less durable* than many other good paints. No white paint is durable, in the technical and practical sense of protecting the wood from weather-injury, hence, consumers of this group want a paint that *stands neglect well*, that is, a paint that does not look too shabby for a long time after it has really worn out and lost its protective value, and that can safely be repainted after such long intervals without going to the expense of removing the old coating. White lead paint makes a soft, elastic film that chalks deeply and wears down to a thin film between repaintings. It fails by checking and fine crumbling, whereas harder paints, which contain zinc oxide, usually fail by cracking, curling, and scaling, and must be repainted before curling and scaling get well started if trouble with subsequent coats is to be avoided.

In the listings which follow, the order of mention has no particular significance and no preference can be indicated for one brand over another. The directions for mixing, furnished by the manufacturers for these pastes, will usually be found to be satisfactory.

A. Recommended

Dutch Boy Soft White Lead Paste (National Lead Co., 111 B'way, N.Y.C., and affiliated companies)
Carter White Lead Paste (National Lead Co.)
Eagle White Lead (Eagle-Picher Lead Co., Temple Bar Bldg., Cincinnati) pt 32
SW ODP White Lead Paste (Sherwin Williams Co., 101 Prospect Ave., N.W., Cleveland)
Pioneer Paste White Lead (W. P. Fuller Co., Mission and Beale Sts., San Francisco)

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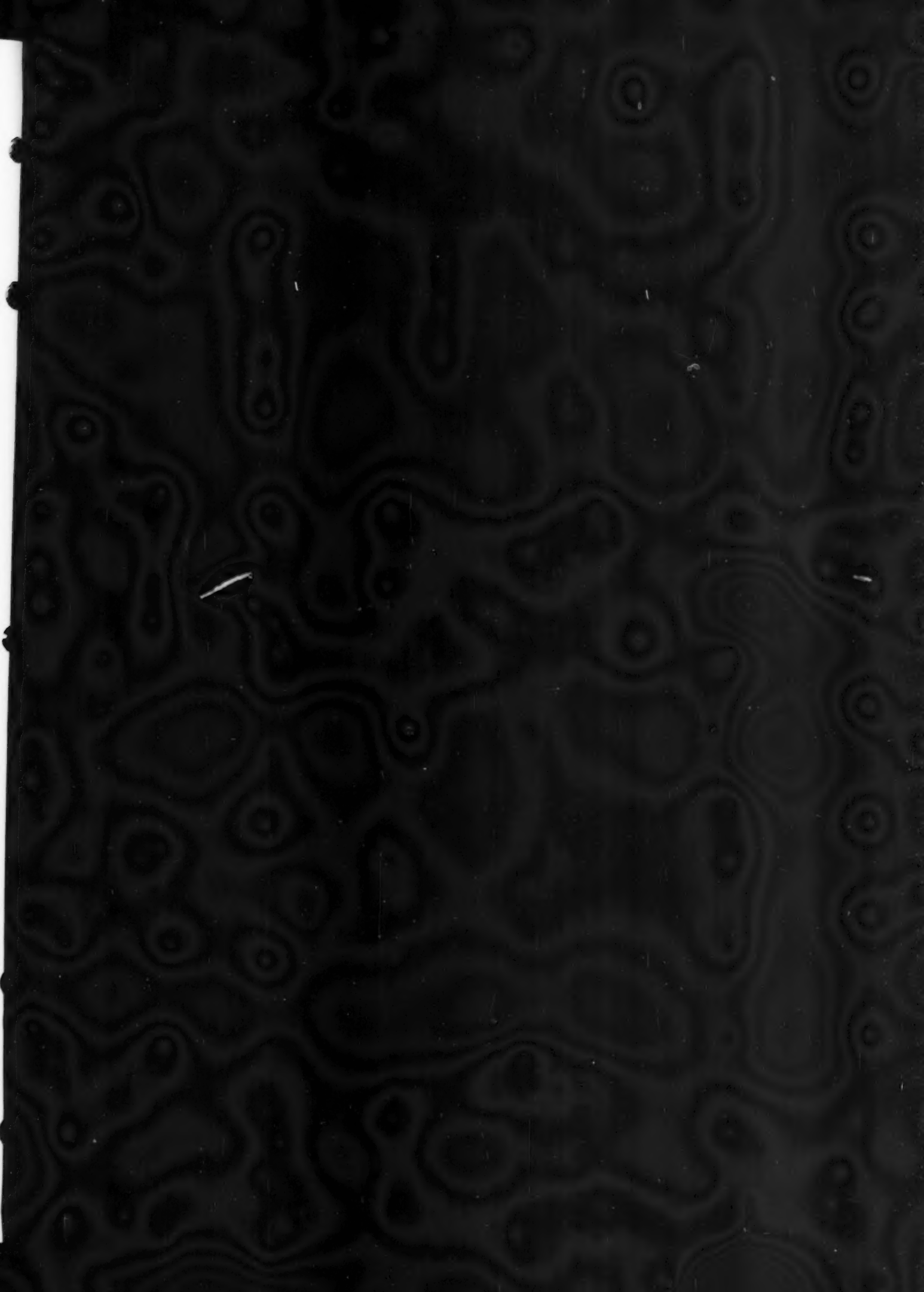

If You Are A Librarian

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Refrigerators
Hearing Aids
Rubbers and Galoshes
Neckties
Electric Ironers
Razor Blades
Sewing Machines
Radios
Linoleums
Cameras
Defrosters
Tire Chains
Maple Sugar
Men's Suits
Cooking Ranges
Vinegar

Partial List of Some of the Special Articles

Vitamin Cosmetics
Repainting Houses
Advice on Oil Burners
Quacks in Psychology
House Insulation
Phenolphthalein Laxatives
How to Buy Jewelry
Electrical Shock Hazards
Values in Ten-cent Cosmetics
Facts About Rayon
Luggage for Travel

This Magazine Has Special Interest for You

CONSUMERS' DIGEST, a monthly magazine for consumers, contains the kind of information which makes it highly suitable for a place on the library reading table.

Published for popular dissemination of the constantly increasing data on wise buying, it presents concisely and authoritatively in each issue large amounts of interesting material for the general reader.

Its definite recommendations on hundreds of products named by brand name, original articles, and reprints from numerous sources keep the reader constantly abreast of nearly all that's important on consumers' topics.

CONSUMERS' DIGEST accepts no advertising, has no commercial affiliations whatever, exists solely to educate the consumer in wise buying.

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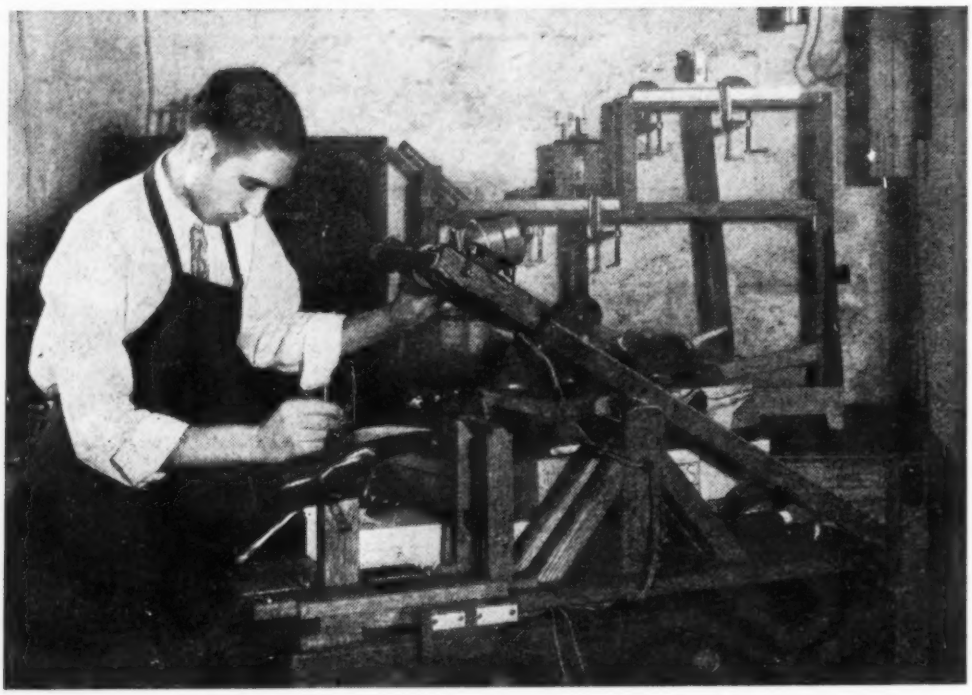

What Should A Consumers' Testing Service Really Offer You?

CONSUMERS' Research has been thought by some to be overcritical or captious in reporting its findings. Such persons are unfamiliar with the techniques employed by CR in arriving at its conclusions with respect to the products reported upon. The findings and conclusions are checked and rechecked before they are issued to subscribers, and in consequence, CR's reports have seldom been invalidated, even in minor details, by data adduced by interested firms seeking to support objections to CR's findings on a product.

The policy of Consumers' Research has been, and is, simply to report any consumer health or dollar hazard of significant importance whenever we know it to exist. Pseudo consumer-protection-agencies of one type are content to endorse a product if it is not manifestly poisonous or otherwise quite unsuitable for use. That a product, though harmless, may be very inefficient or be priced at several times its real value—is no concern of theirs. Here the ancient rule of *caveat emptor* is held to apply, the unwary buyer's pocketbook too often pilfered. Consumers' Research holds that this should concern a consumers' testing agency; that generalities and a hope-for-the-best attitude fall far short of protecting the consumer. Useful information means concrete, specific information—naming products by brand name without resorting to generalities or evasions.

● *To test shoes, an abrasion machine is used (as shown above) in addition to other methods of examination and test. Consumers' Research names all brands tested and shows which brands are the best value.*

● *It is important to every woman to know what low-priced face powders are of good quality.*

● *Pseudo-testing laboratories do not consider it important to rate radios with respect to their fidelity (naturalness) of tone reproduction. Yet this is what interests the music lover most. Some moderate-priced sets are far superior to expensive ones in this respect.*

Consumers' Research Does Not Permit Use Of Its Seal Or Name In Selling Any Product!

● *The seal of Consumers' Research serves to maintain in constant view the ideals for which the organization works.*

THE seal of Consumers' Research appears on no product. Consumers' Research has no commercial affiliations whatsoever. Its sole job is to "serve consumers." This service involves making available to its consumer-subscribers the most completely unbiased, accurate, and authoritative information that its technicians carefully assemble, on the many things which consumers need to buy.

● *What laxatives are safe, or least harmful to use? Subscribers to Consumers' Research know the answers to these important questions. Yet advertisements are still accepted by magazines maintaining consumer bureaus, for drugs which have been known to be habit forming and to cause other distinctly harmful effects.*

Consumers' Research, moreover, concerns itself with extending the fullest possible protection to the consumer—his pocketbook as well as his health. Its recommendations are based on merit—on the outcome of laboratory tests and other analyses conducted by skilled engineers, physicists, and chemists. In addition, prices of the articles tested are given and, in many cases, they are rated according to their prices, as well as on their technical merit.

● *Canned goods of the same brand vary in quality. One variety may be good, for example, but another of the same "line" may be of low quality. Quite commonly the pseudo-agency for consumer protection misleads its readers, who tend to assume that the "approval" stands for all the products sold under the trade name - whereas some will be good and some poor.*

Because of its independent standpoint, its complete freedom from commercial aims or profit, and its critical attitude toward unwarranted assaults upon the consumer's pocketbook in much current advertising, Consumers' Research is, naturally, barred from telling its story in popular publications dependent upon advertising for revenue. Consumers' Research now, as in the past, must look to you, as a person interested in raising consumers' standards, to interest new subscribers in the service. The steady growth of the organization, which is an advantage to all subscribers in increased volume of testing and reports, must depend in large measure upon you and other subscribers who already recognize the value of the work being done and can conscientiously recommend it to friends and acquaintances. The order blanks below are for your convenience. Please pass them on to friends who will be interested.

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Consumers' Research, Inc., Washington, N.J.

☐ I enclose $3 (Canada $3; foreign $3.50) for one year's subscription to the Consumers' Research Bulletin (which includes Annual Cumulative Bulletin number and monthly Bulletin numbers—except during July and August).

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Previously Issued

FOR the benefit of new subscribers, some Reprints and Special Bulletins previously issued are listed. A full list of all previous CR Bulletins, Handbooks and other material still in print is available on request accompanied by a 3c stamp.

Reprints

(Not confidential)

THE DENTIFRICE RACKET, by Catherine Hackett. Reprinted from the "New Republic" of Jan. 15, 1930. 2 pp., 10c

TESTIMONIALS, C.O.D., WHOLESALE, AND F.O.B., by Alva Johnston. Reprinted from the "Outlook and Independent" of March 18 and 25, and April 1, 1931. 4 pp., 10c

SCOT TISSUE. Reprinted from the "Journal" of the American Medical Association of July 16, 1932. 2 pp., 10c

GRAYBAN. Reprinted from the "Journal" of the American Medical Association of Nov. 5, 1932. 1 p., 10c

THE GLASS OF FASHION, by Jean Broadhurst. Reprinted from "School Science and Mathematics" of Oct. 1932. A discussion of trends in advertising. 4 pp., 10c

WHO IS RESPONSIBLE FOR HEALTH? by George A. Coe. Reprinted from the "World Tomorrow" of Aug. 1933. 2 pp., 10c

GANGSTERS, INCORPORATED, by Col. Clair Foster. Reprinted from "R/9" of Feb. 1933. The need for Congressional scrutiny of the infringement of the rights of amateur radio service. 4 pp., 10c

GYP ROW—HOW IT FOOLS THE PUBLIC [in buying a radio set], by Joseph P. Salzman. Reprinted from "Radio Retailing" of July 1933. 2 pp., 10c

ANTISEPTICONSCIOUS AMERICA, by W. W. Bauer. Reprinted from the "American Mercury" of July 1933. 2 pp., 10c

WHAT GOVERNMENT DOES AND MIGHT DO FOR THE CONSUMER, by F. J. Schlink. Reprinted from "The Annals" of the American Academy of Political and Social Science of May 1934. 18 pp., 10c

THE MINERAL CRYSTALS AND SALTS RACKET. Published by the Division of Food and Chemistry of the North Dakota Regulatory Department, March 1935. 4 pp., 10c

FOOD AND THE CONSUMER, by Dr. G. W. Monier-Williams, Chief of the British Ministry of Health. A lecture at Bristol University before Inst. of Chem. of Great Britain and Ireland, Oct. 7, 1935. Emphasizes the gravity of the dangers of commercially oriented research in food supply problems. Enlightening to chemists and consumers alike who may suppose that industry may tamper with the natural characteristics of the food supply without danger of untoward effects upon public health, present or future. Mimeographed. 8 pp., 10c

THE COOPERATIVES—AN EXPERIMENT IN CIVILIZATION, by J. B. Matthews. Reprinted from "Atlantic Monthly" of Dec. 1936. Advertising and sales technics of the London, Belgian, and Swedish cooperatives are discussed. Claims for various articles sold under cooperative trademarks are examined and tested in the light of what is actually known about the products themselves. Cooperative products critically examined from the consumer's point of view in the same manner that CR applies to goods capitalistically manufactured and sold. 11 pp., 5c

PARTIAL BIBLIOGRAPHY of books and important articles related to the economic problems of the Consumer. 1936. 141 references, including references selected for background value. Single copy free. In lots of 25, 40c per lot; in lots of 50, 50c; in lots of 100, 70c. 10 pp.

Special Bulletins

Special Bulletins which are listed below as confidential are available only to *current* subscribers to the confidential ("combined") service on payment of the proper amount in advance. Others may be had by anyone.

CONSUMERS' TEST MANUAL. Comprising simple and readily applied tests of common household articles and supplies suitable for use by students of chemistry, physics, general science, household arts, and by consumers generally. Chemical Section now ready. Not confidential. 38 pp. (including index), 50c

FUR—SB 8. Aug. 1933, revised Nov. 1934. How to select, clean, care for; definitions and wearing qualities of different furs. Not confidential. 23 pp., 50c

PLUMBING—SB 16. Sept. 1934. Discussion includes selection of plumber; piping; septic tanks and cesspools; plumbing fixtures and fittings; domestic water heaters (with listings of 33 makes); water softeners; private water-supply systems. Confidential. 21 pp., 25c

ADVICE ON THE CHOICE OF AN OCULIST, and THE EYES—SB 19. May 1935. A discussion of the relative value to the patient of the training and methods of the oculist as compared with those of the optometrist, with notes on various other controversial points, such as the use of "drops," toric lenses, etc. The article on THE EYES is a reprint from CR's Handbook of Buying, Nov. 1933. Not confidential. 12 pp., 50c

THE TOXICITY OF COD-LIVER OIL, compiled by Jarvis M. Smith, M.D.—SB 23. Oct. 1935. A condensed digest of the scientific literature on the subject. Confidential. 16 pp., 25c

WHAT ADVERTISING MEN SAY ABOUT ADVERTISING—SB 25. Oct. 1936. Criticisms by advertising men of their own work, misrepresentations, and malpractices. 31 quotations from articles, speeches, and trade paper comments. Not confidential. 10 pp., 10c

A CONSUMER'S STUDY OF AUTOMOBILE GASOLINES AND LUBRICATING OILS—SB 26. Aug. 1937. General discussion, no listings by brand names. Not confidential. 16 pp., 25c

MEN'S and WOMEN'S LEATHER SHOES

THE shoe is a pig in a poke to ninety-nine out of a hundred consumers. There is probably no other article of apparel concerning which the average individual's ignorance is more colossal, nor is there any product in respect to which his risk of being stuck by a bad product, or his own or the shoe clerk's poor judgment, is greater. Even the young high school graduate who has had an expensive education in French irregular verbs and the Gallic wars will not know a "shank" from a "vamp" nor a "counter" from a "quarter"; he will very likely not know, even in the most approximate sense, how a shoe should fit his foot, or have any idea of the ill consequences to health and comfort that can follow the purchase of a badly designed or badly fitted shoe.

SHOE FITTING

Expensive as the consumer's education in irregular verbs or Elizabethan drama may have been, ignorance of the elements of shoe fitting will almost certainly prove more costly in the long run. The elements of a properly designed and well-fitting shoe (Figures 1 to 3) are, however, simple enough—a straight or nearly straight inner line, length sufficient to give one-half to three-quarters inch of space beyond the toes (an inch for children's shoes), width at the toes sufficient to allow the toes to spread fully, in a lateral direction, when standing and walking, location of the big joint of the big toe just at the point of rounding-in of the sole on the inside edge of the shoe near the instep, heels broad and low. Shoes should fit snugly from the back of the heel to the ball of the foot, but loosely from the ball to the end of the toes. Though the main principles of proper fitting of a shoe are few and simple, it is a fact beyond argument that most people wear badly fitting shoes.

The results of the failure on the part of the consumer to buy correctly fitting shoes are vast amounts of discomfort and physical ailments. Women much more often than men wear unhealthful shoes. The young girl who wants very dressy and stylish shoes,

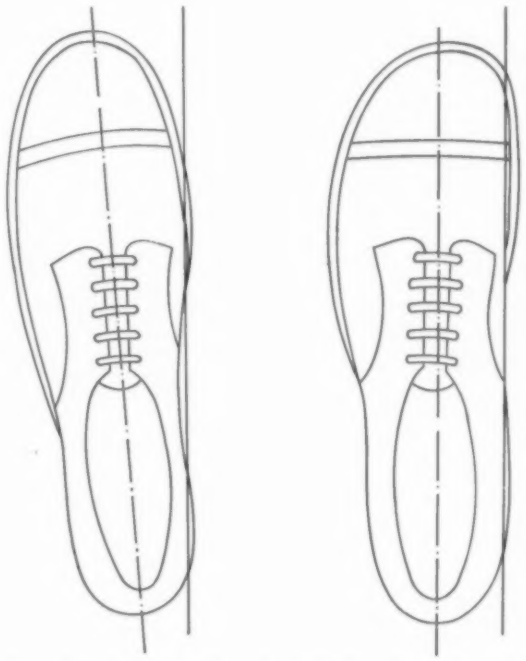

Fig. 2. *An improperly shaped shoe (at left) and a properly shaped shoe (at right). Note the straight inner line and rounded edge of the well-designed shoe.*

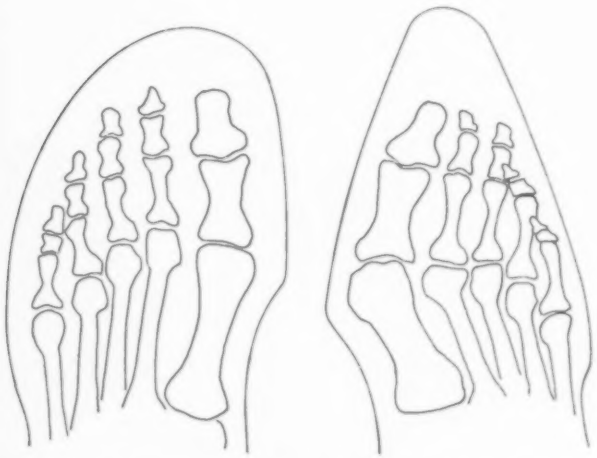

Fig. 1. *Showing effect of a properly shaped shoe and the effect of an improperly shaped and ill-fitting shoe on the bones of the foot. Note that the big joint of the big toe should be close to or opposite the point of rounding-in of the sole on the inside edge of the shoe, near the instep.*

which are usually bad for her feet and general health, is known as a "chippy" in the coarse vernacular of the slick city shoe salesman. For the sake of wearing high-heeled shoes which are thought to "slenderize" and "make the foot look small," a young woman will suffer all manner of discomfort, ruin the shape of her legs, increase the prominence of her hips and abdomen, and acquire a sway-back (Figure 4). These unattractive and unhealthful posture defects are not merely imagined results of wearing improperly designed and wrongly fitted shoes, but have been observed by scientific investigators of the shoes and posture of girls in high schools and colleges. Poorly fitting shoes worn at one time or another for long periods are the cause of practically all foot defects other than those which are hereditary or congenital.

If high heels must be worn at times (and many women will consider that from a social standpoint their use is practically unavoidable), they should be worn only a few hours at a time. If high heels have been worn regularly and for a considerable period, however, the change to low heels should be gradual in order that the leg muscles and Achilles' tendons

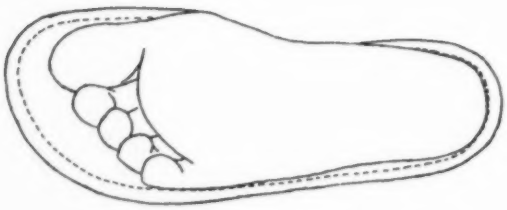

Fig. 3. *A correctly fitting shoe is ½" to ¾" longer inside than the foot (1" for children's shoes).*

may have an opportunity to adjust themselves to normality.

It is well known that poorly fitting shoes are not only harmful to the foot, but potentially harmful to health in a number of other ways. Besides, they have another disadvantage, in preventing the realization of such wear-life as the shoe might otherwise afford.

New shoes must be tried on in order to determine fit; it cannot be overemphasized that, in the present totally chaotic state of shoe standardization, selection by numbered size and width is entirely unreliable. The shoe consumer should forget his or her supposed size number and think only of fit and comfort, for the shoe trade has found it convenient to misrepresent or conceal sizes as a means of flattering the customer, or making the sale simpler or easier. Shoes should be tested for fit with the wearer standing in them. Only the wearer can tell if the big joint of the big toe coincides exactly with the point of sharp rounding-in of the sole on the inside edge of the shoe near the instep (Figure 1). If the big joint falls even a little forward of this proper place in the shoe, the shoe is too short and may give trouble and cause discomfort. One will not be at all safe to judge a new pair of shoes as satisfactory because their total length is the same as that of some other pair which has been comfortable, for the length required depends greatly upon the shape of the toe. For example, shoes with pointed toes must be made longer to afford proper room. A well-made shoe that fits correctly is comfortable to wear even when new and requires almost no "breaking in." Comfort when a shoe is new is determined partly by correct fit and partly by good design and workmanship. Look out for trouble in any event, if a shoe starts out definitely uncomfortable; and if a shoe salesman advises you to take it anyway because it will come out all right when it has been worn for a time, it will be better to move on to another store, for the chances that he is misleading you in order to make a sale are very great.

The tendency in England and on the Continent (partly for reasons of economy and possibly also because of different climatic conditions) is to wear shoes which have much heavier soles than are common in America. Much improved protection of the feet from water in wet and muddy weather is achieved in this way, of course at the expense of some loss of flexibility and lightness in the shoe. Perhaps, however, when the greatly reduced or eliminated necessity for wearing rubbers is considered, the advantage is not in favor of the American style of shoe—at least for winter wear and in regions having much rain and snow.

Shoe salesmen, or "shoe dogs" as they are sometimes known, often earn commissions as well as a regular salary. The commissions depend upon selling "skigs," also known as "P.M.'s," and "findings," such as shoe polish, shoe trees, and arch supporters. The skigs are shoes which the company wishes especially to get rid of. They may be shoes which have been marked up to an especially high price or they may simply be seasonable models going out of style so rapidly that the dealer is afraid they may be left on his hands, or they may be "past models" or "post mortems." Getting skigs off the shelves and selling findings are not only a matter of commissions to the salesman, but also a means of advancement.

The shoe dog calls arch supporters "Happies." The customer who wants an arch supporter is a "happy" customer although as a matter of fact the

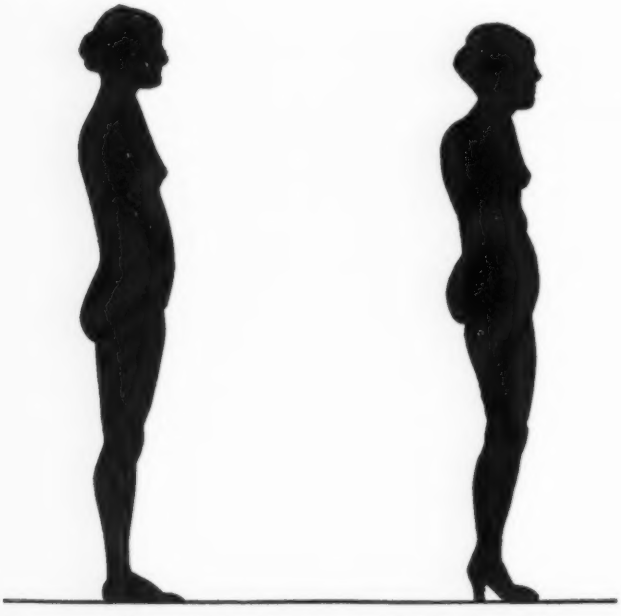

Fig. 4. *High heels produce unattractive and unhealthful posture.*

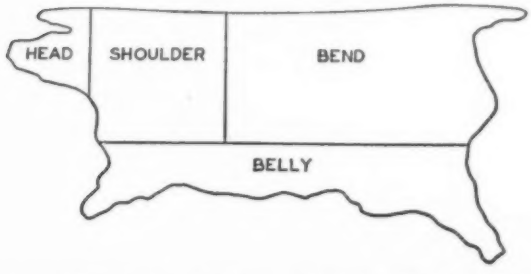

Fig. 5. *The best sole leather is from the bend of the hide, the poorest from the belly.*

shoe dog has his life made brighter in selling the "happy" than the customer's will be in wearing it. The various shoe widths are known as Al, Benny, Charley, Dave, and Eddie. If the salesman has said to you that a shoe is width **C**, he can prove it by merely asking another salesman, "Charley, what width is this shoe?" He will get the answer "**C**," since the desired answer was conveyed in the question by the name "Charley." Stretching shoes on the "thirty-four last" is not stretching them at all, but merely keeping them out-of-sight while the customer thinks the shoes are being stretched. If the skig which the salesman is so anxious to dispose of is too big it may be made to serve by a "jimmy" or two, i.e., a cork pad inserted beneath the insole.

After consideration of some of these devices for selling the consumer shoes which he ought not to wear, the consumer will better understand why he has so often been disappointed in his shoe purchases and has wondered a few days or weeks after buying a pair of shoes how he could have been so badly misled as to its fit or comfort. The prevalence of these practices is so great as to account in large measure for the very large percentage of unsatisfactorily fitted shoes worn by consumers in general.

Consumers having foot ailments should not resort to orthopedic and corrective shoes without the advice of a competent orthopedic consultant. Many of the numerous brands of shoes purporting to be medically approved or sponsored are merchandised under conditions that work to the consumer's disadvantage in one way or another or to some degree. Proper application of corrective shoes necessarily involves personal, graduate-medical contact with the patient, his feet, and his problems. Far too often, instead of helping the ailment they will make matters worse.

MATERIALS

The durability of a leather shoe is determined by the kinds of leather used, by the quality and treatment of the material, and by the method of putting the shoe together. If the trade were interested in dealing fairly with the consumer, shoes would be labeled in such a way as clearly to inform the buyer of their construction and material and quality of the principal parts, such as the soles, uppers, counters, and heels. There are few items of common

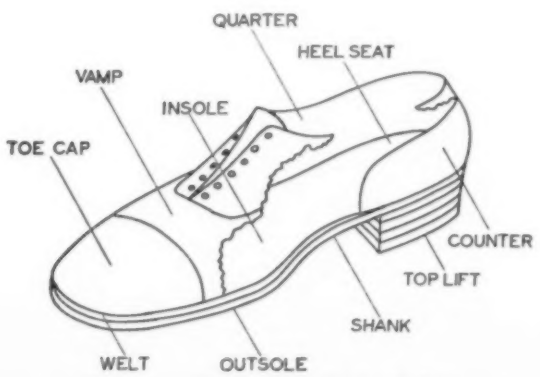

Fig. 6. *Principal parts of shoe.*

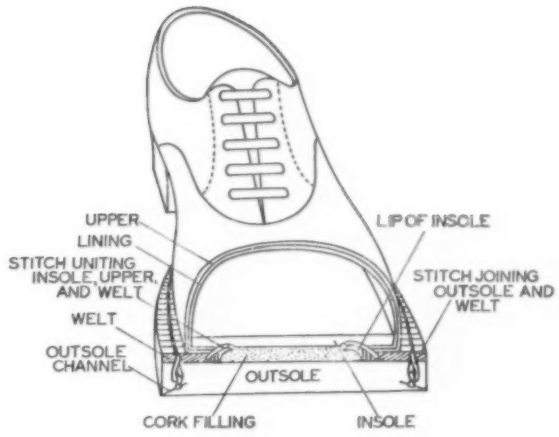

Fig. 7. *Welt-type construction.*

use with respect to which it is more important to give the purchaser a clearer idea of concealed elements of construction and design. It would be safe to say that the knowledge of the formula and ingredients of a shoe would provide almost as valuable a safeguard to the consumer as a knowledge of the formula and ingredients of a headache remedy or pain killer.

Sole leather is made from heavy cattle hides. The best leather is from the "bend" (Figure 5), that part of the hide which was over the choice cuts of meat; it is twice as durable as leather from the belly, and half again as durable as leather from the shoulder. The leather may be vegetable-tanned or chrome-tanned. If chrome-tanned, it is necessary to wax the sole to make it satisfactorily water-resistant, except in very dry regions of the country. Waxed chrome soles, though they do not wear so well as unwaxed chrome soles, do wear better than vegetable-tanned soles, and for this reason are often used on shoes which are to be given hard wear. Vegetable-tanned soles are, for dress shoes, regarded as generally preferable to chrome-tanned soles; they are more porous than the waxed chrome-tanned soles and hence are more comfortable (keep the foot cooler in hot weather); yet they are sufficiently

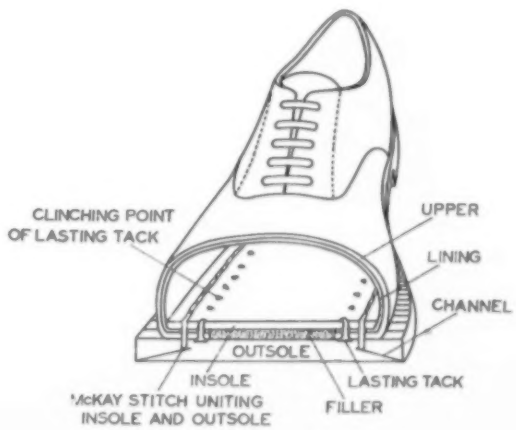

Fig. 8. *McKay-type construction.*

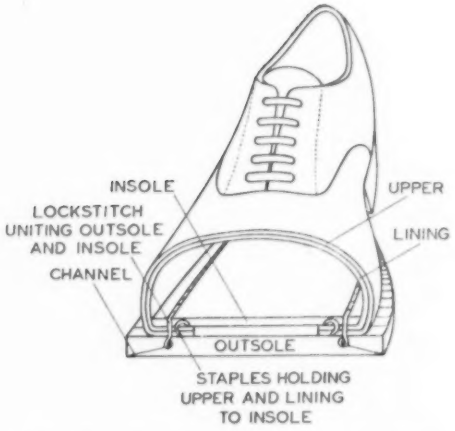

Fig. 9. *Littleway-type construction.*

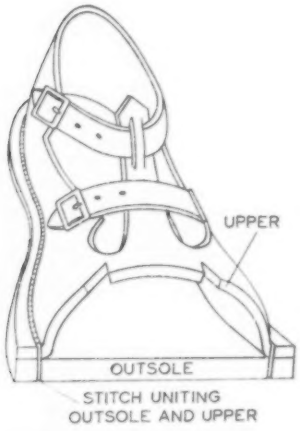

Fig. 11. *Stitch-down-type construction. Child's shoe.*

water-resistant for ordinary use. The soles of Army and Navy officer's shoes have vegetable-tanned soles.

Genuine calfskin is one of the most satisfactory of leathers for uppers, because of its pliability, smooth texture, and strength. It is generally made of the full thickness of the hide; the thickest places may be shaved off a bit in order to make the thickness more uniform. Much of what is called calf leather, however, is really cattle leather, made by "splitting" the thicker, heavier skins of larger animals into two or more layers. The outside layer is durable but is not so pliable as calfskin. The inside layer or layers, known in the trade as "split," are much less desirable. Grain leather, which is the outside of the hide, may often be recognized by hair holes, similar to those seen on the back of a man's hand; but the appearance of grain leather is sometimes closely imitated nowadays by skillful embossing of split leather.

Other good leathers for the upper parts of a shoe are kid leather (so called), cordovan, coltskin, horsehide, "elk," kangaroo, pigskin, buckskin, ostrich, shark, sealskin, and reptile skins. Kid leather, which is not kidskin, in fact, but goatskin, is thinner and more pliable than calfskin and is fine for women's shoes. Cordovan, which is made from the rump of the horsehide, is extremely durable but heavy, stiff, and non-porous, and hence does not make for coolness of the feet in hot weather. (In making cordovan, an inside layer of the hide is used.) Coltskin and horsehide are good for men's heavy shoes.

"Elk" is not elkskin but cattle hide or heavy calfskin of special tannage. Work-shoe "elk" is sometimes buffed to remove imperfections and its durability is thereby reduced. Lightweight "elk" is made into sport and children's shoes and makes a soft sturdy shoe.

Sheep and lamb skins are too soft and pliable to make satisfactory uppers. "Bargain" kid shoes are likely to be made of sheepskin. Patent leather is varnished or enameled leather—usually cattle hide—and has little to recommend it except its neat appearance. The best grades are made from horsehide and coltskin. Patent leather checks and cracks when it grows older. It is uncomfortable because it is stiff and nearly airtight and watertight.

Desirable linings are good soft leather for the back part of the shoe and good-quality fabric or soft leather for the front. The quality and workmanship of a shoe lining are of vital importance to the wearer. A carelessly made or poorly finished lining material can cause untold misery to the wearer of the shoe, and can in time produce such serious chafing and irritation as to make it practically unwearable. It is worth while, therefore, for anyone to examine the lining and its finish and smoothness, at least as carefully as one examines the more conspicuous parts of a shoe. It is worth while to acquaint oneself with the various constructions and finishes of shoe linings in shoes of the highest price and quality. To do this helps one to recognize the points and qualities of linings that one must watch out for in buying lower-priced shoes.

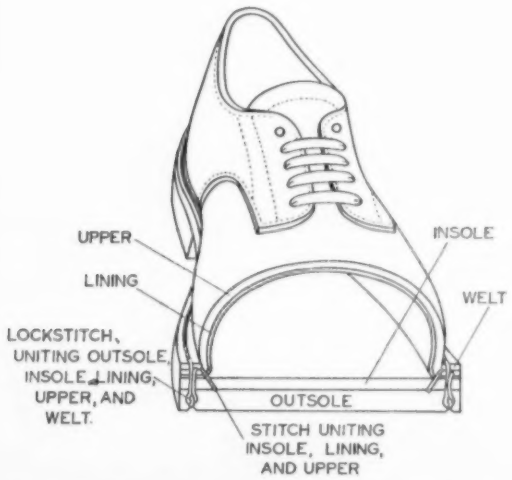

Fig. 10. *Stitch-down-type construction. Adult's shoe.*

Toe caps and counters (Figure 6), to be durable, should be made of good leather. The counters of

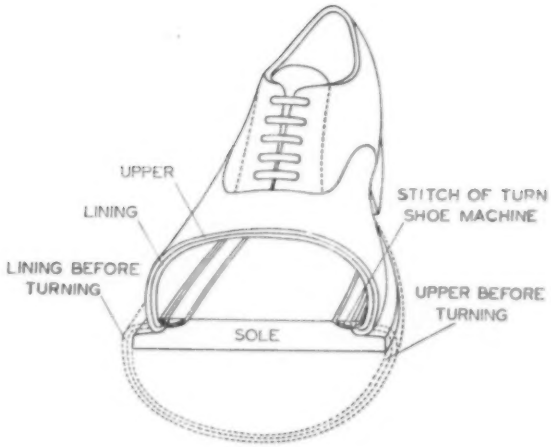

Fig. 12. *Turned-type construction.*

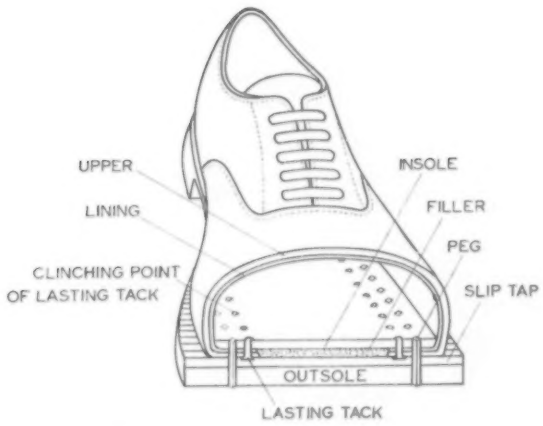

Fig. 13. *Pegged-type construction.*

most men's shoes are leather; but counters of women's shoes are generally paper. Insoles should be made of porous flexible leather.

CONSTRUCTION

The most common types of shoe construction are the welt, the McKay, the Littleway, the stitch-down, the turned, the pegged or nailed or screwed, the cemented, and the moccasin (Figures 7 to 16). Numerous variations are made in these constructions, so that, counting the variations, there are forty or more common ways of making a shoe.

Two-thirds of men's shoes are welt shoes. This is a good-wearing, comfortable type of shoe and can easily be resoled by sewing a new sole to the welt. The outsole and the upper of the shoe are separately attached to the welt, which is a narrow strip of leather resting on the projecting part of the outsole. With this method of making a shoe, there are no nails or stitches passing through the insole.

The McKay construction is cheaper than welt construction and less comfortable and durable. The upper and insole are tacked together and then the upper, insole, and outsole are sewed together with the McKay chain stitch. The stitching and tacks can be seen by lifting the "sock lining." This is a thin piece of leather or fabric pasted to the insole for the purpose of covering the tacks and stitches. McKay shoes may be resoled by nailing or cementing on a new sole, though not so neatly or readily as welted shoes.

The Littleway construction is similar to the McKay in that the upper, insole, and outsole are stitched together, but instead of tacks there are staples attaching the upper to the insole. The sewing is more deeply imbedded in the leather than it is with McKay shoes.

Stitch-down shoes are used mostly in children's shoes. The upper is turned outward, instead of inward as with the other types of shoes described, and then stitched to the outsole. It may or may not have an insole. It may also have a welt, but the welt does not serve the purpose of the welt in the welt-type shoe, that is, of being a connecting link for joining the upper and insole to the outsole.

The turned shoe is a lightweight, comfortable, flexible shoe designed for dress wear. The name signifies the method of construction. The upper and the sole are sewed together when wrong side out, and then the shoe is turned right side out.

The pegged, nailed, and standard-screw shoes, as their names imply, have the sole and upper attached to the insole by pegs, nails, or screws. The upper and insole are also tacked together. Usually there is a midsole (slip tap) between the insole and the outsole. The construction resembles the McKay construction except that it lacks stitching. It is used to make heavy work-shoes.

Cemented shoes are those in which cement is used instead of stitching, nailing, or tacking, etc., for attaching the upper, insoles, and outsoles. Often stitching or tacking is used for joining some parts, and cement used for joining the others.

The moccasin is distinguished by the upper extending completely under the foot and then being closed on top of the shoe with a U-shaped toe piece. It may have a single or a double sole. The moccasin is light, flexible, and comfortable, but some have

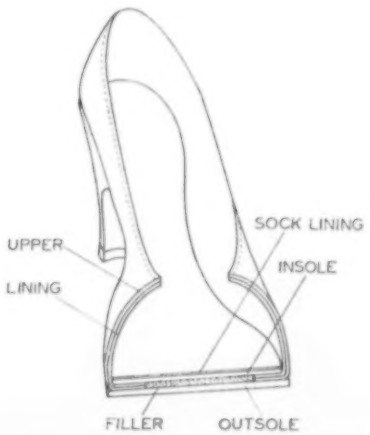

Fig. 14. *Cemented-type construction.*

found it to be too warm for summer wear. (This may be due to the lack of ventilation or "breathing" of the shoe at the bottom surface of the wearer's foot. "Breathing" of shoes is a matter of importance to many wearers, particularly in hot weather. CR would welcome reports from subscribers who have had experience in the matter.) The mock-moccasin, which has the general appearance of a moccasin, is in reality a welt shoe; it is durable and comfortable, and likely to be priced lower than the true moccasin.

CARE OF SHOES

Shoe trees should be used to keep shoes in their proper shape when not being worn. For best life of shoes it is advisable to wear a given pair only every second or third day, to permit perspiration, which is ruinous to leather, to dry out better. Shoes used for heavy outdoor use should be kept greased, using neat's-foot, cod, cod-liver, or castor oil or tallow or wool grease or some mixture of these. The grease should be applied warm (but not hot) to warm shoes and worked into the leather. If shoes are to be polished after oiling, only castor oil should be used; this should be allowed to soak into the shoes for a day before applying polish. A shoe polish should be neither acid nor alkaline. Some shoe polishes contain nitrobenzene, which can often be identified by its strong almond-like odor. Such polish should not be used on shoes while being worn, for nitrobenzene (related to anilin) is very poisonous and in a number of cases has been absorbed through the feet with the effect of causing severe poisoning. Sole leather will wear better if made water-resistant by treatment with oil or grease, but in summer the soles should only be lightly oiled or they will increase perspiration and reduce foot comfort markedly—and indeed greatly increase the tendency to acquire or spread an "athlete's foot" infection (epidermophytosis).

When shoes are wet, they should be dried only very slowly, and never near a hot radiator or stove. Leather is easily damaged by too much heat, and its susceptibility to injury is especially great when the leather is wet. After cleaning off mud and dirt from shoes, it is advisable to apply oil (on street shoes a moderate amount of castor oil will serve, as already noted, in reference to shoes which are to be shined). When the shoes have been oiled, they should be set aside to dry slowly while stuffed with paper to prevent distortion or warping during the drying period.

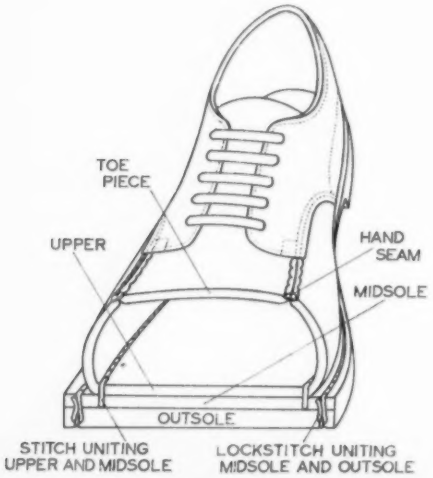

Fig. 15. *Moccasin-type construction.*

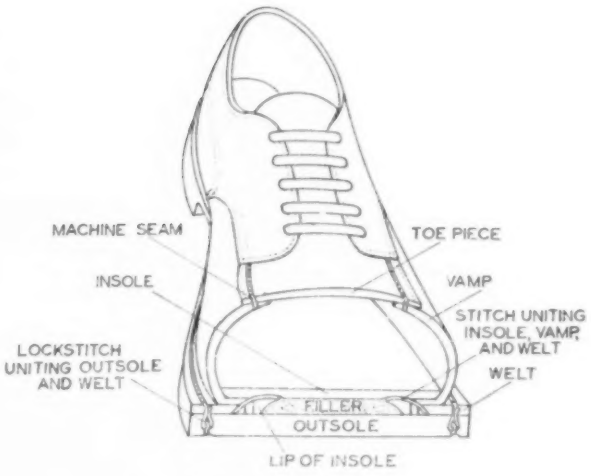

Fig. 16. *Mock-moccasin-type construction.*

The wear that can be obtained from the soles of shoes may be greatly increased at small cost by cementing to them, from time to time as required, the thin rubber and composition auxiliary or "stick-on" soles obtainable in many ten-cent stores and listed in mail-order catalogs. (See CR *Bulletin*, October 1936.) A subscriber reports on use of a suggestion hitherto printed by CR and still easier and cheaper than the "stick-on" soles. He obtained very satisfactory results in multiplying the wear-life of shoe soles by applying to the soles every two or three weeks a liberal amount of a thin varnish, for example the "Wipe-on" Bakelite varnish obtainable in bottles at the 10-20 cent variety stores. Most of this type of varnish will soak quickly into the leather.

TESTS OF MEN'S and WOMEN'S SHOES

In CR's latest tests of shoes, more than two dozen samples of well-known brands of men's and women's shoes were dissected (Figure 17) and subjected to numerous tests. Abrasion resistance, resilience, and moisture absorption of the soles were measured. The upper materials were subjected to various tests to measure their strength and stretchiness. The heels, linings, etc., were carefully examined for quality of material and workmanship. Comparative resistance of the upper leather to scuffing was determined on a testing-machine especially designed by CR for the purpose. In determining the ratings, principal weight was given to the measurements for resistance to abrasion and to other characteristics of the sole. The probable

lasting-quality of the sole leather of a shoe was determined by an abrasion test. In calculating the abrasion resistance of soles, account was taken both of the resistance to abrasive loss per unit thickness of leather (specific abrasion resistance) and of the thickness of leather available for wear. In the tests made by CR, it was found that abrasion factors varied from 17 to 30 for men's shoes and from 12 to 30 for the women's. Thus there is a much wider variation in the quality of sole leather used in women's shoes and the best sole may be expected to give 2½ to 3 times as long a life as the poorest, according to the grade and type of sole leather employed. The quality of leather used is thus seen to be a most important determinant of the annual cost of keeping the feet properly shod. Consideration was next given to the general construction of the shoe, quality of the counters, linings, heels, etc., and, finally, to the behavior of the parts of the uppers under test, i.e., the measurements of the breaking strength, tear resistance, etc. All shoes were of the welt-type construction unless otherwise stated. Prices of the men's shoes tested ranged from $3.95 to $10; of the women's shoes, from $2.85 to $10.98. The highest-priced shoes were found in the test to be good shoes, and fortunately, some low- and medium-priced shoes were also found to be of good quality. When two prices are given in the listings, the first is the advertised retail price, and the second, in parentheses, is the price actually paid at retail for the shoes tested. Unless otherwise stated, sole-abrasion resistance was found to be average.

Ratings are cr 38 except as noted.

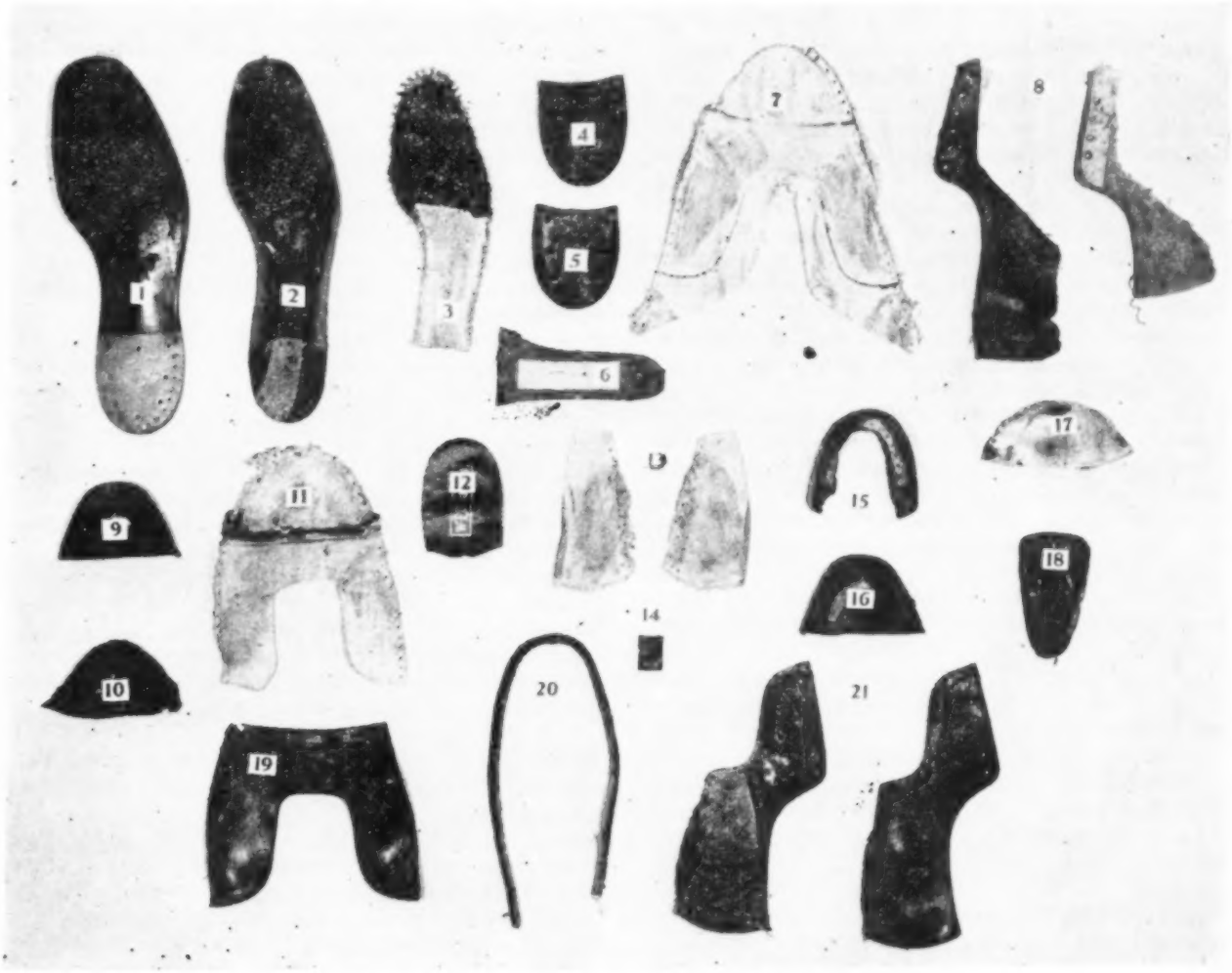

Fig. 17. Main parts comprising a welt-type shoe

1. *Outsole*
2. *Insole, bottom side*
3. *Insole backing and cork cushion*
4. *Rubber heel*
5. *"Compo" heel base*
6. *Shank piece, wood and cardboard, heel end to right*
7. *Lining from toe and vamp*
8. *Leather lining from counter and quarter*
9. *Toe piece of impregnated felt*
10. *Toe piece reinforcing fabric*
11. *Toe and vamp reinforcing*
12. *Heel pad*
13. *Counter reinforcings*
14. *Top edge piece, rear seam*
15. *Counter*
16. *Toe cap*
17. *Toe cap lining*
18. *Tongue*
19. *Vamp*
20. *Welt*
21. *Outside leather of counter and quarter*

Not Confidential—Co nsumers' Research, Inc.

WOMEN'S SHOES

A. Recommended

Regal (Regal Shoe Co., N.Y.C.) $3.95. Littleway construction. Good sole-abrasion resistance. **1**

Red Cross (United States Shoe Corp., 1658 Herald Ave., Cincinnati) $6.50. Good sole-abrasion resistance. Had better quality upper leather than *Regal*, but counter not so well constructed. **2**

Rugby (Sold by R. H. Macy & Co., Inc., N.Y.C.) $5.98. Turned construction. Good sole-abrasion resistance. Shoe was constructed of good materials and was one of the few women's shoes having the desirable leather counter. Its heel base was of wood, which is relatively undesirable, though it does contribute to lightness of weight. This is one of the few shoes available year after year in a wide range of sizes from the narrowest to the widest widths. It is a "spectator sport" shoe of comfortable type made in only one style, but in a variety of leathers. **2**

Florsheim (The Florsheim Shoe Co., 541 W. Adams, Chicago) $9.75. Shoe was well made, of good materials, and was one of the few women's shoes having a leather counter. Full lining of leather may be considered too hot for some feet. Had wooden heel base (see under *Rugby*). **3**

B. Intermediate

With exception of the *Endicott-Johnson* shoe, the following shoes were made with unprotected paper counters. This is considered undesirable, as counter would fail if wet and shoe would be unable to hold shape.

Bean (Distrib. L. L. Bean, Freeport, Maine) $3. Rubber sole; found less durable than good leather. The uppers were of split leather. **1**

Endicott-Johnson, No. 02221 (Endicott-Johnson Corp., Endicott, N.Y.) $2.85. Materials were of relatively low quality; although counter was of paper it was protected with water-resistant felt. **1**

Enna Jettick (Dunn & McCarthy, Inc., Auburn, N.Y.) $5. Good sole-abrasion resistance. Materials about average in quality. **1**

Improved "Sportster" Scout Shoe, De Luxe Model (Sold by Stern Bros., N.Y.C.) $4.98. Uppers of good quality leather. **1**

Indian Walk (Sold by Foot Form Shoe Shops, Inc., N.Y.C.) $7.85. Good sole-abrasion resistance. Materials about average in quality. **2**

C. Not Recommended

Sears, Cat. No. 15—2500 (Distrib. Sears, Roebuck & Co.) $3.98 plus postage. Construction of light, relatively low-quality materials. Low sole-abrasion resistance, indicating probable short life of sole. **1**

Sport Mode (A. S. Beck Shoe Corp., 139 Duane St., N.Y.C.) $3.98. Materials average in quality. Sole cemented instead of stitched to welt, a construction considered undesirable. **1**

Wards, Cat. No. 24—866 (Distrib. Montgomery Ward & Co.) $3.45 plus postage. Construction of light, relatively low-quality materials. Low sole-abrasion resistance, indicating probable short life of sole. **1**

Krippendorf Foot Rest (Krippendorf-Dittman Co., Cincinnati) $6.95. Littleway construction. Materials good. Good sole-abrasion resistance. Would be rated *B* on materials and workmanship, if to be purchased on advice of competent orthopedic physician for a person requiring a corrective shoe of the *Krippendorf* type. **2**

Dr. M. W. Locke (Lockwedge Shoe Corp. of America, Inc., Columbus, Ohio) $10.98. See comments on disadvantages of and potential harm by "corrective" shoes in foregoing discussion. (Fuller discussion in CR's Feb. 1935 *Bulletin*, 20c to subscribers only.) Incidentally, salesman erroneously claimed purchaser needed "corrective" shoes and should have worn them before. Would rate *A* on materials and workmanship if to be purchased on advice of competent orthopedic physician. **3**

MEN'S SHOES

A. Recommended

Each of the men's shoes in the *A* group showed a good sole-abrasion resistance factor.

Bean Comfort, No. 400 (Distrib. L. L. Bean, Freeport, Maine) $4.90 plus postage. A well-made, sturdy shoe. Comfortable toe design; but blunt appearance may be objectionable to some persons. Made only in D and wider widths. (Many men should wear shoes of wider widths than they are accustomed to buying. The purchase of shoes which are too narrow and unduly crowd the toes, often brings about definite malformation of the foot.) **1**

Nunn-Bush, No. 1371 (Nunn-Bush Shoe Co., 2822 N. Fifth, Milwaukee) $8.75 ($6.95). Good materials and construction. Thick sole. **2**

Walk-Over, No. 3841 (Geo. E. Keith Co., Brockton, Mass.) $8.50 ($7.45). Well-made shoe of good materials. **2**

Bostonian, No. 2471 (Commonwealth Shoe & Leather Co., Whitman, Mass.) $10.50 ($8.75). Good materials and construction throughout. **3**

Florsheim, No. M2089 (The Florsheim Shoe Co., 541 W. Adams, Chicago) $10. Very sturdy. Full leather lining, though giving smooth inside finish, has disadvantages for persons having irritation or other troubles from hot or sweating feet. **3**

Nettleton Buckminster, No. 063 (A. E. Nettleton Co., Syracuse, N.Y.) $13.50 ($7.85). Heavy Scotch grain leather, not well suited to summer wear, except in cooler regions. A very well-made shoe. **3**

Stetson, No. 1086 (Stetson Shoe Co., Inc., S. Weymouth, Mass.) $11.50 ($9.95). A good, well-made shoe. **3**

B. Intermediate

Douglas, No. B3508 (W. L. Douglas Shoe Co., Brockton, Mass.) $4.40. Good design, but sole was least resistant to abrasion, of all men's shoes tested. Reported not made in widths narrower than B. **1**

Hanover, No. 38S (Sheppard & Myers, Inc., Hanover, Pa.) $4. Well-made shoe, but leathers used were of only average quality. **1**

Regal, No. 1267 (Regal Shoe Co., N.Y.C.) $5.85. Sole third lowest in resistance to abrasion. Quality of upper slightly better than *Hanover;* sole not so good. Though elaborate mechanical devices are used for determining proper shoe size, as reported in a previous *Bulletin*, fit obtained this time, also, was not good. **2**

C. Not Recommended

Endicott-Johnson, Geo. W. Johnson No. 28352 (Endicott-Johnson Corp., Endicott, N.Y.) $5.50. Resistance to sole abrasion, low. Had cardboard counter. **1**

Fortune, No. Z-107 (General Shoe Corp., Nashville, Tenn.) $3.95. Resistance to abrasion, low. Had cardboard counter. **1**

Jarman Friendly, No. 117 Comb. 824 (General Shoe Corp.) $5. Sole second lowest in resistance to abrasion. Had cardboard counter. **1**

Police & Fireman (Endicott-Johnson Corp.) $6.95. pt 38 **2**

Arsenic Spray Residues

ALTHOUGH much has been written about the occurrence of poisonous lead and arsenic spray residues on fruits and vegetables, the general public often feel that any possible poisonous effect due to these causes must be of very rare occurrence. Moreover, public health authorities and federal and state food and drug administrators frequently brand authors of articles on poisonous spray residues and their prevalence on widely marketed fruit and vegetables as "sensationalists who twist the truth to suit themselves." One even finds occasionally physicians who make light of the hazards of arsenic poisoning and a few perhaps who still give arsenic as a tonic, though its danger, and potential hazard of subsequent cancerous skin affections from such use, are now coming to be discussed in medical literature. One has but to read the medical journals to realize that the hazards of arsenic in the food supply are great and sharply increasing.

THE INCREASING HAZARD

Due to increased insect menace, the use of arsenical sprays has increased by leaps and bounds in the past two decades. Large-scale farmers now buy these chemicals in wholesale quantities—oftentimes in tons or even carload lots! The average person has the conception that fruits are sprayed only when in flower, and hence that it is almost impossible for any appreciable quantity to remain on the matured fruit. Such is not the case. With apples, it is recommended to spray the trees twice before the petals fall and *four times* while the fruit is developing, the spraying being continued until September! Consider the following recommendation in the case of peaches: "We must at all times during the development of the peach, *right up to the time it is consumed*, maintain an adequate protecting film *covering the entire fruit*...." [Italics mine.] In a major apple-growing state, the leaves and fruit of trees ready for picking were seen, which were gray with spray residue. In the case of vegetables, when insect menace is great, sprays are often applied up to within a few days of harvesting. In some cases the method of applying the spray is so crude that the vegetables are covered with the poison, even penetrating to the inner leaves. Occasionally, the chemical substance undiluted has been applied by an improvised duster or shaker made from a tin can with the top punched with holes, directly upon the plants, by an ignorant gardener who did not read or was unable to read the directions which require the material to be diluted very greatly—for example, one pound of the powdered substance to fifty gallons (or over four hundred pounds) of water.

Because of the tremendous amount of spray employed, there is even the possibility of *absorption* of arsenic by the plant in sufficient quantities to make the plant tissues themselves toxic. This is true in the case of selenium (see *Consumers' Digest*, September 1937, pp. 1-9), plants varying greatly in their ability to absorb selenium, and hence in the amount of selenium which goes into their leaves and fruit, or seeds. In the case of lead arsenate, the widely employed toxic chemical used for insect sprays and dusts, it has been shown that application of the poison to soil did not modify germination of pine seeds, but did retard growth. Analysis of the seedlings indicated that they contained 90 parts per million of arsenic when grown on soil treated with 500 pounds of lead arsenate per acre and 144 parts per million on soil treated with 1500 pounds per acre.

On the other hand, research on an apple orchard which had been sprayed with 3500 pounds of lead arsenate per acre during twenty-five years indicated that apples and pears absorbed but 0.00026 to 0.00029 grains per pound of arsenic although the soil contained 23.2 to 580 parts per million. In the case of lead, present in the soil to the extent of 30 to 1383 parts per million, analysis of the apples indicated very little absorption. It remains to be seen whether other fruits and vegetables will absorb dangerous quantities like the pine or but minute amounts such as the apple and pear (plants very closely related botanically). Certain it is that there are wide variations in the ability of different species of plants to absorb toxic materials already in the soil or added in fertilizer or sprays, and the information so far available does not permit of any accurate prediction of the danger that may exist in any given case. Quite possibly, also, the nature of the soil and its chemical constituents might affect the extent of absorption of arsenic by plants. The table on pages 272-273 of *Eat, Drink and Be Wary* (after Myers, Throne, Gustafson, and Kingsbury in *Industrial and Engineering Chemistry* of June 1933) shows that the possibilities of absorption into the inner portions of fruits and vegetables are considerable, for sizable amounts of arsenic have been found in the pulp of eggplant, carrots, tomatoes, peaches, and apples.

LACK OF GOVERNMENTAL PROTECTION OF THE CONSUMER

Naturally, producers of fruits and vegetables, and those responsible for their marketing nationally on a wide scale, are opposed to publication of facts regarding the spray hazard. The departments of state and federal governments which serve the farmer and are interested in higher prices and greater sales for farm produce also join in opposing the views of those who point out the hazards to the consumer of wide extension and increase of spray residues. Such commercially interested persons nevertheless realize that, unless the practice of allowing the residue to remain on the fruit is curbed, the consumer will finally go on a "buyer's strike." The apple industry experienced something almost

in the nature of a buyer's strike some years ago, when European nations threatened an embargo on American apples because of excessive spray residues which they carried when delivered in European markets. After a case of poisoning in England which was thought to be due to spray residues on American apples, the British government sent a special envoy to confer with the United States Department of Agriculture. The Department realized that disastrous economic consequences would result if European countries, anxious for the safety of their populations, refused to purchase American apples, and agreed that domestic apples *intended for export* would be kept within the "world tolerance," so called, for spray residue (for arsenic—1.4 parts per million, equivalent to 0.01 grain per pound, which is also the legal limit in the United States).[1]

The enforcing of this agreement did not take the shape of occasional inspection of shipments as is the case with domestic produce. Indeed not! Such hit or miss inspection may be tolerated by domestic consumers, but was not acceptable to foreign governments, and hence was not permitted for export shipments where, if the tolerance limit were not carefully enforced, serious economic loss, or even partial or total loss of a market, might result, to the great disadvantage of American agriculturists. An elaborate system, involving certification of proper sampling and chemical testing by competent chemists testing appropriate fractions of each lot, was conceived to prevent the exportation of all apples containing potentially dangerous spray material. Thus the federal government prohibits the exportation of fruit with excessive spray residues. But the laws under which the Food and Drug Administration operates were equally intended to prevent shipment between states in the United States of such fruit, and, in most states, exactly the same point applies to the states' own legislation affecting commerce within their borders. In working out protection of foreigners from oversprayed fruits, an "informal" agreement was entered into by the apple association and steamship companies so that the latter would not accept apples for export unless accompanied by a properly safeguarded certificate showing that the produce was within the legal limit. In 1933, this became a law when the "Export Apple and Pear Law" was passed. This makes it unlawful for any person to ship, or for any carrier to accept, carlot shipments of apples or pears *intended for export* unless accompanied by a certificate from the United States Department of Agriculture.

To make this specific, an Oregon apple producer may ship many carloads of apples to the East. Those intended for export must, before the shipment can clear the port, bear a certificate from the Department of Agriculture. Those intended for domestic consumption need carry no such certificate nor need they have been tested for their arsenic content! They may carry much arsenic or none—though in point of fact, few indeed would be found to meet the latter description. Surely the government should not be more concerned with the health of foreign consumers than with that of its own people. Prior to 1933, the answer to any request by consumers for protection through certification of fruits and vegetables would have been met with the plea that such a plan was of such magnitude that it was not possible. Now it seems that it is not impossible, so far as export produce is concerned—and truly enormous quantities of apples are exported. Even the United States Government's Federal Surplus Commodities Corporation, which is buying "surplus" apples to help the apple growers at the taxpayers' expense, is requiring that the lower grades of apples bought in this way shall meet inspection and tests so that the spray residue will be below the standard tolerance requirement elsewhere mentioned. Why cannot the same scheme of certification be used for domestic produce intended to be sold to persons not on relief and not living abroad?

The government, nowadays, can hardly plead that it is a matter of economy of government when the public debt is rising rapidly—with the government appearing to act as though it were determined to spend money in ways that would permit no one to accuse it of being economical or efficient in expenditures. New Deal administrators seem particularly happy when a maximum amount has been expended for services and few, and only the most general or diffuse or dubious, benefits are received. When a flood or similar emergency occurs, New Deal administrators vie with each other in announcing that all needed funds and personnel will be available at once—however many millions of dollars and thousands of technical and service workers are required. It cannot be denied that the emergency due to the slow poisoning of the whole population is a less dramatic and interesting one from a political point of view and its correction less likely to win votes than the arrival of men and machines in a flooded region or a countryside devastated by drought, fire, or insect pests.

It is not the case that all shipments of domestic produce are left without control. Anyone familiar with the *Notices of Judgment* of the United States Department of Agriculture will realize that seizures of shipments of produce containing excessive spray residues are common enough indeed; they indicate what the situation would be if the inspection and analytical tests were systematic, effective, and continuous rather than random, occasional, or exceptional. With interstate shipments condemned by the Food and Drug Administration, the system is very different from shipments abroad. Instead of a system of control and certification for every shipment, protection is obtained by occasional and random inspection of shipments. Certainly the number of shipments that are actually subjected to control must be a small fraction of one percent. *100,000,000 Guinea Pigs* explains how large an organization of inspectors and technicians would be required if fruits and vegetables were actually to be

[1] The governmental limit or tolerance of 1.4 parts per million appears on all present evidence to be much too high. For a discussion of this figure and other interesting material on the arsenic hazard, refer to *Consumers' Digest*, April 1938; also to *CR's Annual Cumulative Bulletin* (available only to subscribers to the confidential service).

effectively controlled and how small a working force (under one hundred men) is now available to cover all of the interstate shipments by truck, steamship, and railway over the whole of the United States and its territories and dependencies. In that book (page 255) it was shown that the number of inspectors operating throughout the United States could just be about sufficient to deal effectively with the Philadelphia food marketing area.

The Food and Drugs Act was passed to protect the *consumer* from such impurities as spray residues. The Export Apple and Pear Law was passed to protect the *producer*, since a threatened embargo would close foreign markets and the keeping open of foreign markets for American fruit is a topic which is frequently under discussion both by agriculturists and their representatives in Congress. Both acts are enforced by the United States Department of Agriculture, a branch of the government originally designed to assist and protect the *farmer*. Committed as it is to the support of agriculture, the department has on many occasions, with the support and pressure of legislators from agricultural states, given a special turn to its regulations and permitted failures of control which have been very bad for the health and welfare of consumers. Thus it has come about that the larger proportion of fruits and vegetables, and foodstuffs generally, go into commerce entirely uncontrolled by the acts or concern of any federal or state authority.

The United States Department of Agriculture has no control over material produced and consumed within the state, since acts of Congress (that is, those passed prior to the New Deal) were limited under the American constitution to the control of matters directly affecting interstate commerce. Within the states, the problem becomes, as a rule, one for the State Department of Agriculture (sometimes other departments are involved), and control varies considerably in its effectiveness. Most of them perhaps would like to keep the spray residue within the world tolerance, but practically none of the states employ sufficient numbers of qualified experts to do more than scratch the surface of the problem. Many employ no qualified experts, and among those that do, some find it impracticable or inexpedient to permit them to act effectively in this particular field, because of the great political power of farmers in agricultural states and the farmer's natural antagonism toward a state department which seems to him to interfere with a free market for his produce. California ranks high among the states in the Union as respects the magnitude and competence of the operations of its state government; yet California has chronic difficulties with poisoning of its consumers by fruits and vegetables coated by spray residues; in some instances these occurrences have affected scores or hundreds of persons at a party, dinner, or banquet, as attested by frequent newspaper accounts. In one case, at least, even a group of physicians were made ill by arsenic-sprayed foodstuffs.

In some states where the situation has become particularly serious, the state government, perhaps in cooperation with federal officials, has even set up field laboratories where the farmer may bring his produce for examination and be given advice on the elimination by brushing and washing of excessive amounts of residues beyond the legal limits. If intelligently and continuously handled, and not sporadically and casually, the matter could be put upon a basis which could do no injustice to farmers and would cause them little expense or inconvenience, at least in regions where fruit and truck crop production represents an important part of the total farm income. (In regions where fruit production, for example, is smaller or more scattered, the cost to government and producer alike of administering proper inspection would be somewhat greater; perhaps in some cases it would need to be carried as an expense of local government.)

It must be borne in mind that there are always a few producers who look at dollars and cents and think too little of human lives. They seem at times to care little if their product is poisonous, so long as they can sell the product—preferably without the trouble and cost of acid-washing the fruit. Some fruit trade journals constantly encourage agriculturalists in this attitude by carrying articles which purport to show that the hazard from arsenic and lead is not a real one, that the whole issue is but the product of the disordered minds of some sensational writers who know nothing of chemistry or toxicology and who write as they do because for some unstated reason they have become hostile to fruit- and vegetable-growing interests. Some of the articles in farmers' and fruit-growers' journals, which have been used in this way to propagandize farmers and make them feel that the whole issue is an unreal one, have been literally astonishing in the degree to which they have misrepresented the situation and sought to show that the hazard was a chimerical one, not worthy of serious consideration. Such articles have also asserted, without ever adducing proof, that the control measures by state and federal authorities are very thorough and efficient and adequate in amount, and that, besides, much research work is going on continually which has resulted in the solution of most of the practical problems so far as consumers are concerned.

Such trade journals have done yeoman service in persuading many farmers who would otherwise be careful and considerate in their use of spray materials, that they need give little thought to any duty of protecting the rights of consumers to an uncontaminated food supply. They have also helped to add to the pressure upon government bureaus, state and federal, as a result of which tolerances have tended to be increased rather than diminished, and inspection has been made lax rather than careful and thorough-going.

Several years ago North Carolina experienced a serious threat to its cabbage crop because of maggots. Large quantities of arsenical insecticides were used to combat the menace. Naturally, much of the produce contained very large amounts of the insecticides, in some cases thousands of times the legal limit. The producers were warned and field laboratories set up, after much harm had already been done to consumers, of course. So much poison was present that, in most cases, washing did not suffice, and the outer leaves had to be stripped.

Many fields had to be abandoned and the vegetables left to rot upon the ground because the insecticide had penetrated to the heart of the cabbages.

Naturally, stripping the cabbage meant greatly added expense in labor as well as loss in weight of the product. Even though farmers had been warned of the large quantity of spray residue, *in some cases sufficient to cause immediate death*, a few of them continued to ship the produce. The United States Department of Agriculture made many seizures, and the State Department of Agriculture was forced to institute a road patrol and even a system of certification to protect the consumer. So great was the hazard that health authorities of Baltimore found it necessary to seize and condemn cabbage summarily, and did this not only in wholesale and retail markets, but in a few cases, on account of the extreme menace of poison in particular shipments, followed them right into the home and took the poisoned food from the table or from the pot where it was cooking. Many more such cases could be pointed out, but the above illustrates the seriousness of the hazard, and its unpredictable character, depending upon the habits of particular growers or regions and the extent and type of the insect menace at that time and place.

WHAT THE PRODUCER CAN DO

What can the producer do? There are, apparently, two solutions to the problem. If arsenical sprays are used, the residue must be removed by proper washing. On some fruits, if the sprays are properly used (and farmers can readily find out how to use them, from bulletins of state and federal departments of agriculture), washing with care and attention to detail with proper substances will remove the spray. In most cases, because of the insolubility of lead arsenate, water alone does not remove the spray completely. Some years ago it was found that the treatment which was being used to remove arsenic was actually causing an increase in the amount of lead on some lots of apples, because lead removed from a part of the lot was deposited upon apples going through the process later. Up to that time, the experts, with that curious blindness and singlemindedness which too often characterizes the specialist overdeveloped in one type of analysis, had been looking with greatest care, attention, and technical skill for arsenic, and practically ignored the possibility of lead being a factor in the consumer's hazards. It was easy to forget lead because, though far more dangerous than arsenic, it does not, unless under rare circumstances, give a quick or acute poisoning as arsenic often does; the action of lead is slow and cumulative, and may only become manifest in a long-delayed, grave illness (sometimes complete physical weakness or breakdown), perhaps after a period of years.

Rain prior to harvest time does not remove much of the spray. It is necessary to remove the spray with water containing some chemical such as hydrochloric acid (in very small quantities), which renders the spray residue soluble and yet does not damage the fruit. (One must not think that because the lead arsenate is not very soluble in water, it cannot be harmful when eaten. Any student of physiology knows that the gastric juice of the stomach contains the same acid which the farmer who is trying to comply with the regulations would use to dissolve the poison and remove it from fruits which have been sprayed—namely, hydrochloric acid!) Farmers can obtain from the departments of agriculture all of the data as to the material used, type of apparatus, even with plans for buildings, containers, etc., which are necessary. The problem is not a simple one, however, and many factors are important, including temperature, safe operation and control of the washing solutions so that they do not become too impregnated with the spray residue which is removed from the fruit, and many other essential features of such nature as almost to require, for reliable results, the constant attendance of a skilled chemist specially qualified in arsenic and lead analyses. And few chemists can conduct such analyses for contaminants in what are known as micro-amounts accurately and reliably, without special study and training. Naturally, it is more economical for the farmer to ship his produce to the market without the expensive washing process; yet the difference between spray residue removal properly conducted and not conducted at all amounts to less than five cents a bushel, in many sections of the country averaging about two or two and one-half cents.

The other solution is the use of non-poisonous sprays, at least for the later sprayings which are done while the fruit is maturing. A few such sprays have been developed by researchers, which are successful in combating many insects, but these cost much more and are not so efficient. They are, on this account, in very limited use (contrary to the implications of many newspaper and popular magazine stories which give the impression that growers have now largely shifted over to the non-poisonous types of sprays lately developed by research chemists).

* * *

A very real hazard caused by insecticides is the harm to farm animals. Spraying may kill bees, and honey has been found to be contaminated with arsenic obtained by the bee when gathering the nectar from sprayed flowers. Frequently, great numbers of bees are killed by the spray which they ingest when gathering the nectar. The use of airplanes to apply chemical substances from the air is particularly disastrous to farm animals and game, which have been known to become ill and often to die as a result of eating vegetation contaminated with such dustings. (This technique of dusting has often been used, at government expense, as a favor to Congressmen seeking votes among farmers.) Milk from cows that have eaten of this vegetation may contain arsenic, likewise the meat of farm animals and poultry. Cases of acute arsenic poisoning from milk contaminated in this way have been recorded. Since arsenic is a cumulative poison, it is undoubtedly stored within the animal and thus contaminates meat; it and other toxic metals are especially likely to be stored in the animal's liver.

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